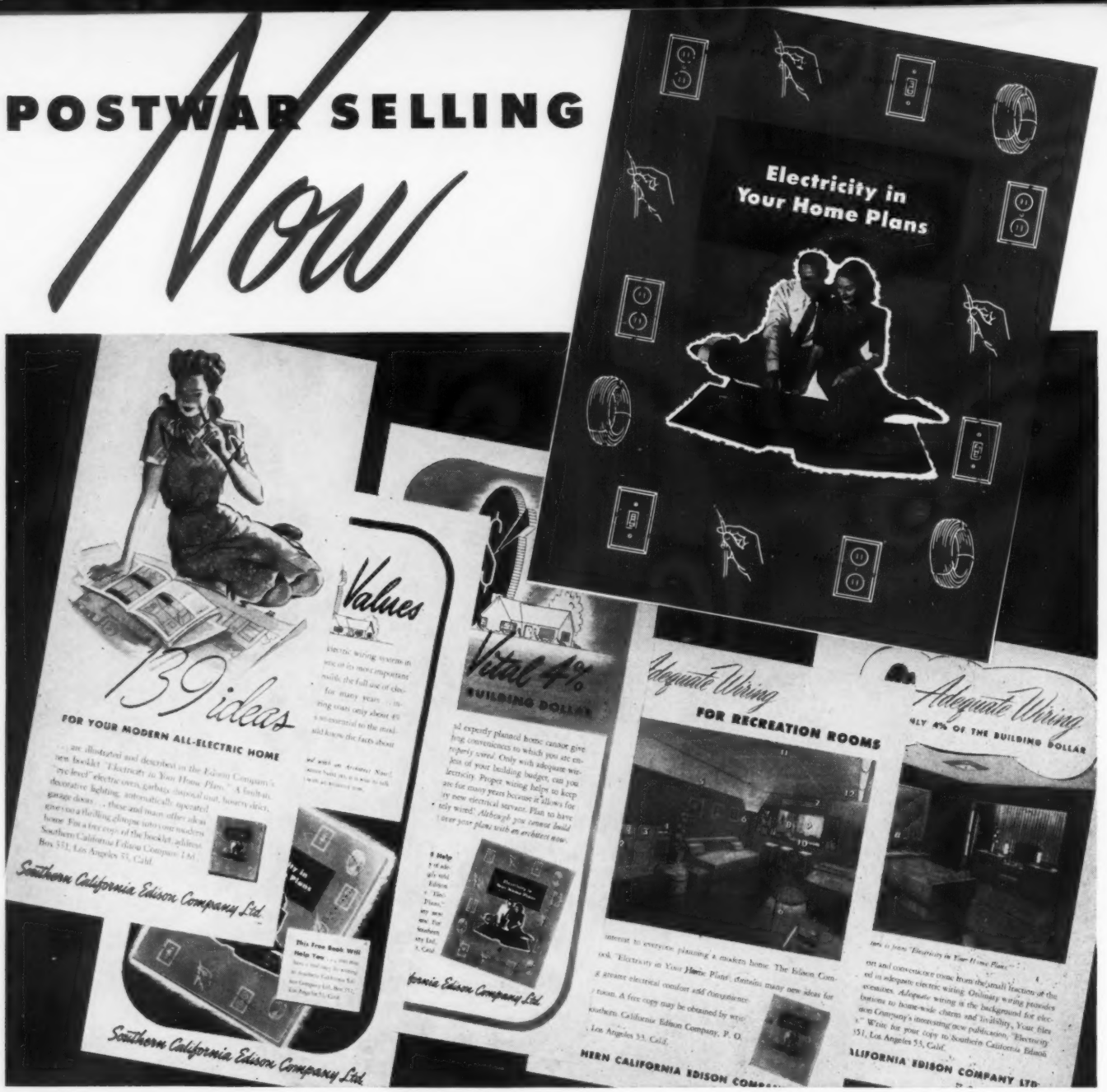
ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U.S.

DECEMBER 1944

POSTWAR SELLING *Now*



Like other members of the electrical industry, the Edison Company knows that successful postwar selling of electrical appliances will depend in part on the electric wiring in consumers' homes. Only in adequately wired homes can proper use be made of every electrical appliance and service.

The booklet and advertisements shown here are part of the Edison Company's program promoting wider knowledge of adequate wiring *now* in preparation for the future. Published recently, the first edition of the booklet already is nearly gone. Thousands of home-planners, architects and building contractors have asked for copies as a result of the advertisements.

Contractors and dealers who do not already have the booklet are invited to send for a free copy.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), December, 1944. Vol. 93, No. 6. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, Canada and Pan-America, $2 per year; all other countries, $3 gold. Single copy 25c.
Copyright, 1944, McGraw-Hill Company of California.

Type E-236 potential transformer, 24,000 volts, for accurate metering service and relay operation

Why IS THE ACCURACY CLASSIFICATION OF THIS INSTRUMENT TRANSFORMER IMPORTANT TO YOU?

Here's the Accuracy:

ASA Burden	W	X	Y	Z
ASA Accuracy Class	0.3	0.3	0.3	0.3

This means that with standard ASA burdens the ratio correction factor and the transformer correction factor will be within the limits of the ASA accuracy class 0.3.

NEMA Burden	W	X	Y	Z
NEMA Accuracy Class	¼	¼	¼	¼

This means that with standard NEMA burdens the ratio error and the phase angle will be within the limits of the NEMA ¼ accuracy class.

Accuracy Classification Helps You KNOW It's the Right Transformer for the Job

THE new ASA system of accuracy classification has made possible the most precise method yet devised for selecting instrument transformers. It enables you to select the most suitable transformer for the job to be done.

For example, different applications often require different transformer characteristics. A current transformer that is satisfactory for metering purposes (highest accuracy up to 100 per cent of its current rating) may not be satisfactory for relaying purposes where the *overcurrent* characteristics (currents as high as 20 times normal) must be considered.

All G-E instrument transformers are classified in accordance with the new ASA system of accuracy classification. A thorough knowledge of this system will help you in the selection of transformers for your particular application. *General Electric Company, Schenectady 5, N. Y.*

Buy Bonds — *and keep all you buy*

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

FOR A BETTER UNDERSTANDING OF ACCURACY CLASSIFICATION

This publication explains the ASA accuracy standards for current and potential transformers and shows how they differ from the NEMA standards. Also, you will find this booklet a handy guide to the selection of G-E instrument transformers. Ask for Bulletin GEA-4240. Address the nearest G-E office.

GENERAL ELECTRIC

604-14-6400

ELECTRICAL WEST

VOL. 93 DECEMBER, 1944 NO. 6

Postwar Competitive Power ..... J. P. McElroy 51

New Problems in Inductive Coordination 53

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Cover photo: Idaho Power Co.'s 106-mile transmission line from Emmett into the Yellow Pine mining area traverses country like this for approximately half its length. The picture was taken early this year, soon after the line was energized and while snow covered the mountainous terrain.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

J. P. McElroy who lays on the table before us the blueprint of postwar competition in power sources, p. 51, comes to his knowledge from long experience in agricultural sales in the San Joaquin Valley. A graduate of South Dakota College of Mines in engineering, he joined San Joaquin Light & Power Co. in 1923 as estimator; became a field engineer in the Fresno sales department in 1925. He did pump testing and so knows the farm power situation from first hand. In September 1943, he was made acting sales manager of the San Joaquin division, PG and E; since 1929 had been its agricultural engineer.

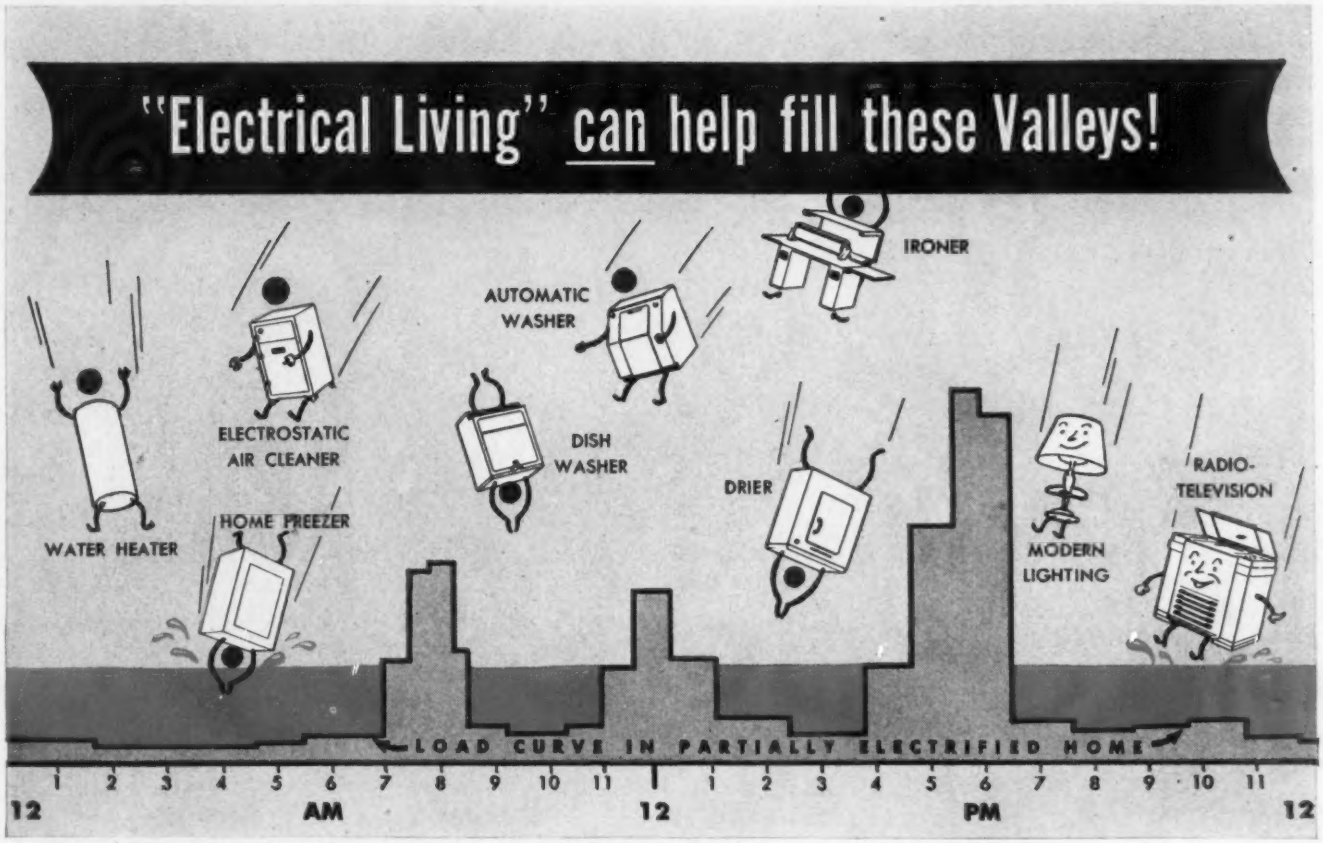
Preview

New Year's Bounty

Something for every reader, no matter what his or her interest in the comprehensive electrical industry, will be offered on the January menu. For sales minded as well as engineers, a report of experience with electric house heating in the Portland area will be revealing. Transportation men will have an article on truck body improvements. Contractors, inspectors and those interested in wiring will be presented some much needed suggestions for changes that should be made. For everyone the "Dream Home of the Future" to end all dream homes will be exposed in all its risibility. Dealers will sit in to glean the usually pertinent and up-to-the-minute summations of their prospects and obstacles which the San Diego Bureau has just made for them.

Interlarded with newsy, condensed information telling of changes, trends, and progress in all departments, the January number will start the New Year bright. To give time for final tabulation of important figures the annual statistical and review number in February will assemble as much work data as possible for the year 1945.

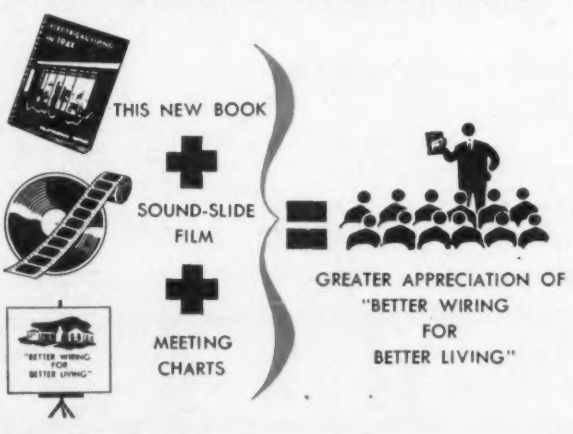
★ BETTER WIRING FOR BETTER LIVING ★


"Electrical Living" can help fill these Valleys!
IRONER
AUTOMATIC WASHER
ELECTROSTATIC AIR CLEANER
DISH WASHER
DRIER
RADIO-TELEVISION
WATER HEATER
HOME FREEZER
MODERN LIGHTING
LOAD CURVE IN PARTIALLY ELECTRIFIED HOME
12 1 2 3 4 5 6 7 8 9 10 11 12 AM 1 2 3 4 5 6 7 8 9 10 11 12 PM

WITH the resumption of normal peacetime production, many types of home electrical equipment will be available to help utilities *fill the valleys* between the morning, noon, and evening peaks.

New electrical equipment such as home freezers, electrostatic air-cleaners, laundry driers, and television sets—as well as the more familiar electric ranges, water heaters, washers, ironers, etc.—will create a new standard of "Electrical Living" after the war.

"BETTER WIRING FOR BETTER LIVING" PROGRAM



But the bottle-neck limiting the widespread use of such load-building equipment will be, more than ever, *the inadequacy of home wiring.*

The "Better Wiring for Better Living" Program . . . *consisting of the new book, "Electrical Living in 194X," a sound-slide film, and meeting charts* . . . has been developed to help utilities break this bottle-neck.

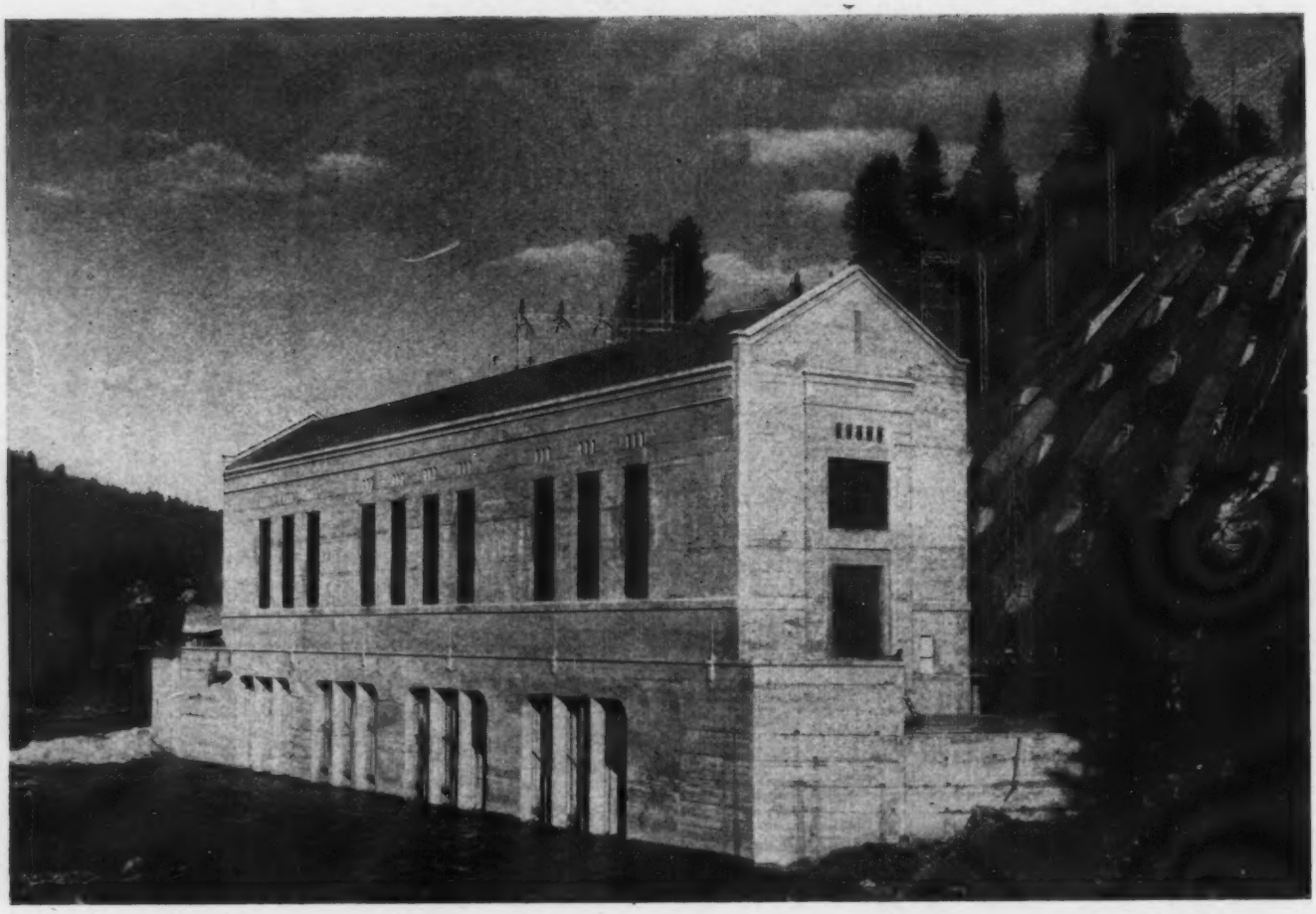
Many utility representatives are now using this material in selling the need for *better wiring* —to architects, builders, engineers, contractors, wiremen, and others interested in building—and to present and prospective home owners.

For complete information regarding the "Better Wiring for Better Living" Program, communicate with your Westinghouse District Office or write: Better Homes Department (EP-124), Westinghouse Electric & Manufacturing Company, Pittsburgh 30, Pennsylvania.

Westinghouse

Plants in 25 Cities Offices Everywhere

TUNE IN: John Charles Thomas, *Sunday 2:30, EWT, NBC.*
Ted Malone, *Mon. Wed. Fri. 10:15 pm, EWT, Blue Network*



Here's where

FOUR PELTON TURBINES

develop

212,000 horsepower

for you

The West is famous for an abundance of low-cost electric power—of great importance now in war production.

Here at the new Pit No. 5 hydro-electric generating plant of the Pacific Gas and Electric Company four Pelton Turbines have been in continuous operation for almost a year.

Along with the turbines, Pelton built the shut-off valves, the water pressure regulators and their control equipment.

For 64 years Pelton Turbines and accessories have been used in the development of vast electric power projects. Many of these big turbines have been put into use recently throughout the West.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

2929 Nineteenth Street San Francisco 10, Calif.

Other Sales Offices in the United States:

Philadelphia 42, Pa.....Paschall P. O.
Chicago 4, Ill. .....627 Railway Exchange
St. Louis 1, Mo.....1010 Pine Street
Washington 5, D. C.....1036 Investment Bldg.
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Boston 10, Mass.....10 High Street
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Cleveland 13, Ohio..2405 Terminal Tower Bldg.

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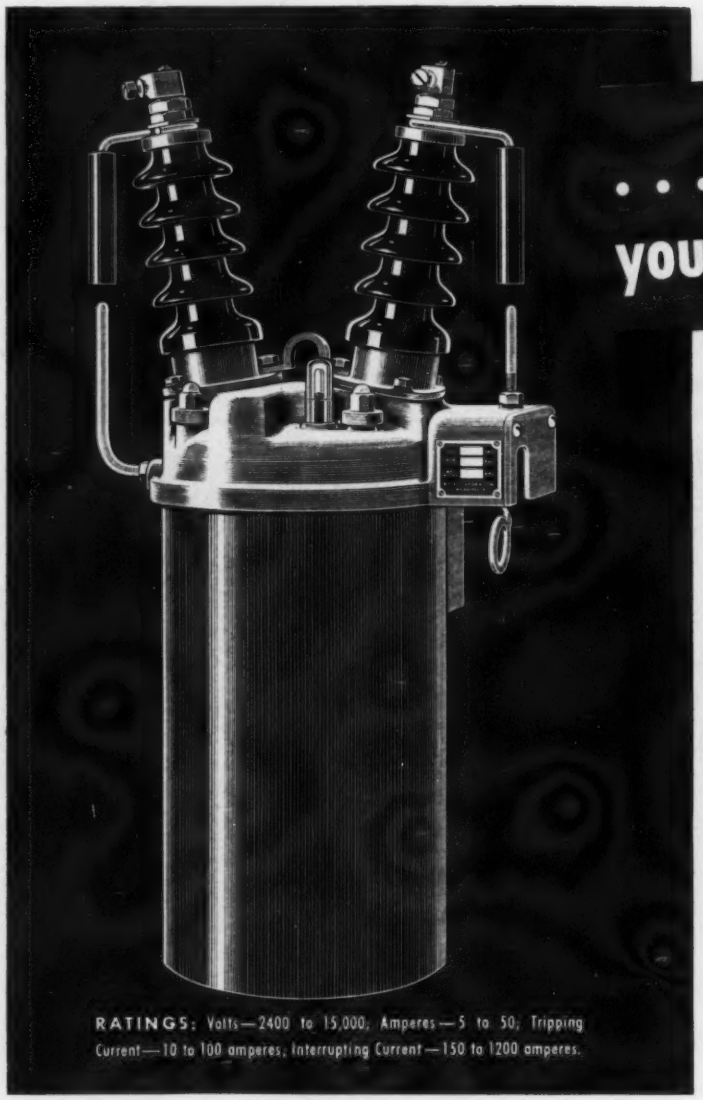
Baldwin Locomotive Works, Paschall P. O., Philadelphia 42, Pa.

BLW THE BALDWIN GROUP

PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS



RATINGS: Volts—2400 to 15,000; Amperes—5 to 50; Tripping Current—10 to 100 amperes; Interrupting Current—150 to 1200 amperes.

. . . . Here is the Recloser you have been waiting for

NEW TYPE "H". . . .

KYLE

AUTOMATIC OIL CIRCUIT RECLOSER

FULLY MEETS ALL LINE PROTECTION REQUIREMENTS

DUAL OPERATING CHARACTERISTICS GIVE YOU . . . TWO FAST OPENINGS to clear all temporary faults
TWO TIME DELAY OPENINGS to isolate branch lines and keep main lines open

The New Type "H" Kyle Automatic Oil Circuit Recloser is the line protection unit you have always wanted—*ONE* Recloser with operating characteristics to meet *EVERY* line protection need.

The Kyle Oil Circuit Recloser is entirely automatic in its operation. It provides a fast opening on the first and second operations. This is followed by time delay openings on the third and fourth operations.

Temporary Faults are cleared by the fast operations of the Recloser without damage to sectionalizing fuses.

Permanent Faults are isolated by time delay operations of the Recloser.

Coordination With Sectionalizing Fuses is possible on the time delay operations of the Recloser. Faults can be isolated before the Recloser locks open by blowing the sectionalizing fuse while service is continued on the remainder of the system protected by the Recloser.

Coordination Between Two Or More Reclosers in series is possible when installed on long rural lines. In addition, sectionalizing fuses beyond any of these Reclosers permit the isolation of any branch line upon which a permanent fault exists.

Ask your Line Material Representative for full information on the New Type "H" Kyle Automatic Oil Circuit Recloser. Let him show you how its use will save you revenue, time and manpower . . . will keep the main lines in operation.

MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

LINE MATERIAL COMPANY

HOW *Excellence*

NIMBLE FINGERS *Experienced Sangamo operators develop such a pronounced sense of touch that their handling of MICA in its initial state of preparation—that of splitting—is accomplished with the greatest dexterity and finesse. "Nimble fingers" inaugurate a quality control through ability that is maintained through each process of CAPACITOR production. Thus, faithful performance of the smallest to the largest unit has its beginning in the intricate art of MICA SPLITTING.*

SANGAMO ELECTRIC

ESTABLISHED 1898 • • • MICA CAPACITORS • • •

IS BUILT INTO ...

SANGAMO
MICA CAPACITORS

★

The many processes that are required in producing Sangamo MICA CAPACITORS involve numerous critical operations. Some of these are MICA SPLITTING, MICA GAUGING, MICA PUNCHING, MICA INSPECTION, and CAPACITOR STACKING. The large photo shows a group of operators performing the highly specialized operation of splitting films from block Mica. Note the specially designed tables, the modern lighting, and the spacious layout to facilitate excellence of production.

Mica Splitting

Only the finest obtainable electrical MICA is used for the dielectric of Sangamo MICA CAPACITORS. The largest quantities of high grade block Mica (so called because it is still intact as a block and not split into individual laminations) come from India, although some Brazilian, Argentine, and domestic Micas are equally satisfactory.

For the manufacture of Capacitors, block Mica must be split into uniform, thin laminations. The voltage breakdown depends upon the thickness and quality of the Mica laminations, while the uniformity of the finished capacitors depends, in large measure, upon the uniformity of the thickness of laminations.

Even in these days of mass production and automatic processing machinery, Mica Splitting is still necessarily a hand operation, for no machines have been developed to split Mica satisfactorily. Deft fingers can usually split Mica into laminations to within 0.0005 inch of the required thickness.

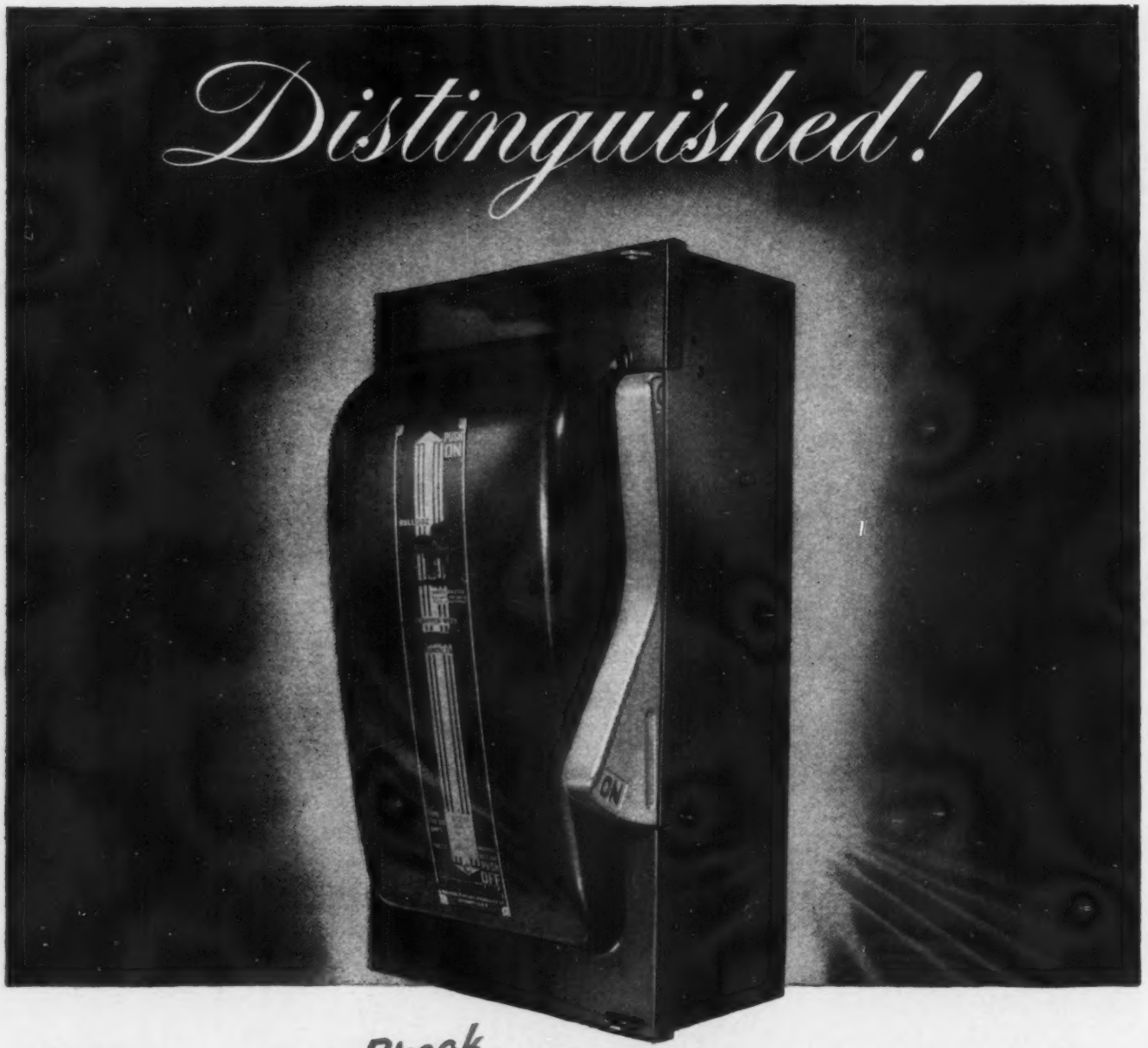
There are many methods of splitting Mica. Some operators prefer to split Mica using a flat knife—others use a needle. In some cases the Mica is laid on a glass, plastic, or wooden plate and laminations are split from a flat surface—other operators hold the Mica in the air while splitting. But no matter which method is used, it is imperative that injuries, such as scratching of the surface, or fracturing of the edges, be avoided during the splitting operation.

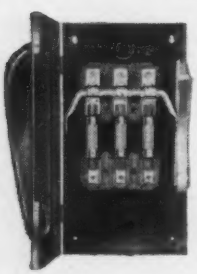
ARMY E NAVY

COMPANY SPRINGFIELD ILLINOIS

• • • WATT HOUR METERS • • • TIME SWITCHES • • •

Distinguished!





Vacu-Break SAFETY SWITCHES WITH "CLAMPMATIC" CONTACTS

There are many valuable *plus features* in BullDog Safety Switches, but none of them increases the *price you pay.*

There is the exclusive Vacu-Break principle of arc suffocation . . . the Clampmatic feature which assures "on" contacts as tight as a bolted connection . . . and the distinguished style of cabinets which combine modern beauty with extra utility.

Such advantages, backed by the BullDog reputation for invariably fine workmanship, account for the fact that a majority of buyers who insist on the *best* are among BullDog's customers.

Capacities from 30 Amp. to 1200 Amp., 2, 3 and 4 Poles, 575 Volts and less.

BULLDOG

ELECTRIC PRODUCTS COMPANY

BOX 177, R. PK. ANNEX, DETROIT 32, MICHIGAN
In Canada: BullDog Electric Products, Ltd., Toronto
Field Engineering Offices in All Principal Cities

Buy More War Bonds

Also Manufacturers of

SaftoFuse Panelboards—Switchboards—Circuit Master Breakers — BUStribution Duct, for "plug-in" power — Universal Trol-E-Duct, for flexible lighting—Industrial Trol-E-Duct, for movable "loads."

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

A ROLL OF SECURITY FRICTION TAPE is just about as important to a good shop repair man as a pair of pliers or a screw driver. Whenever or wherever an emergency bobs up involving electrical connections, "Security" can be counted on to do the job fast, and do it right.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30, E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y. • In Canada: Dominion Rubber Co., Ltd.

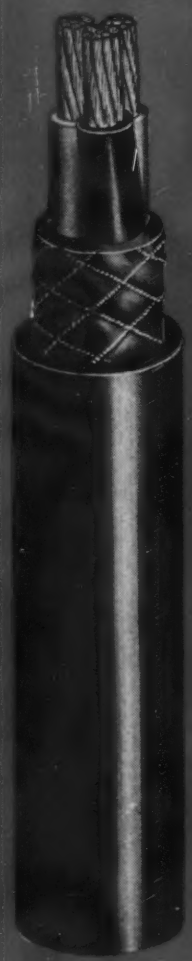
SERVING THROUGH SCIENCE

• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES •
• BUILDING WIRE • SERVICE ENTRANCE CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • ARMORED CABLE •
• PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

Highest Quality

CRESCENT
IMPERIAL NEOPRENE
CRESCORD

For Heavy Duty Industrial Use



The tough NEOPRENE Jacket gives this cable maximum life under the most severe operating conditions. Among its advantages, it is:

ABRASION RESISTING
OIL PROOF
SUN PROOF
FLAME RETARDING
FLEXIBLE
LONG LIVED

Furnished in all sizes
from 18-Two Conductor
to 500,000-Three Conductor

CRESCENT
WIRE and CABLE

CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

Available at Your Electrical Wholesalers

• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

PRODUCTS

that are news

Oil Circuit Recloser (1200)

Kyle Corp. has a new model automatic oil circuit recloser, Type "H." It is said to provide dual operating characteristics which give two fast openings to clear all temporary faults. Two time delay openings which follow isolate the branch line affected and keep the main line open.

According to the announcement, coordination with sectionalizing fuses is possible on the time delay operations of the new unit. Faults can be isolated before the recloser locks open by blowing the sectionalizing fuse, and service is continued on the rest of the system.

For installation on long rural lines, two or more reclosers may be coordinated in series, it is stated. Sectionalizing fuses also may be used beyond any of these reclosers to permit isolation of any branch line upon which a permanent fault exists.

Over-all height of the unit is 27¼ in.; the metal tank is 8 in. I.D. Weight, filled with oil, is 65 lb. It may be pole mounted by means of a through bolt or mounted on a cross arm by a clamp around the hanger. Both terminals are located at the top of the recloser.

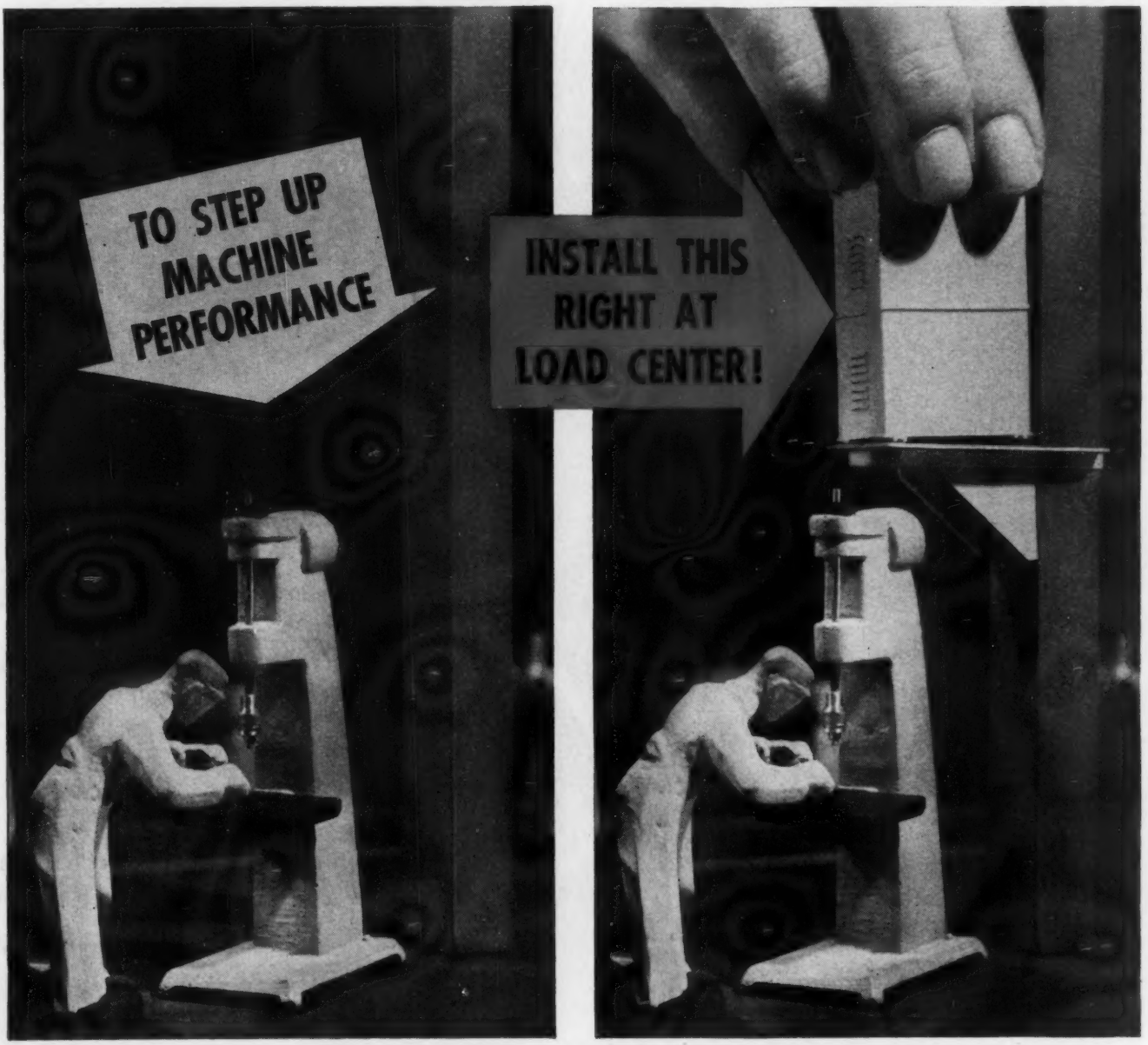
Home Precipitron (1201)

Westinghouse is planning to manufacture a Precipitron unit for the home, postwar. This unit is an electronic air cleaner which traps dust and dirt by charging the particles electrically and trapping them on oppositely charged metal plates. Precipitron units are used now in industrial plants.

Thermistor (1202)

Western Electric announces that the thermistor has been added to its list of products being manufactured for the armed forces. The thermistor is a small circuit element made of a mixture of metallic oxides, which are compressed into discs, extruded into rods or formed into tiny beads. The resulting semi-conducting material has a very high negative temperature coefficient of resistance which gives the thermistor wide application both in electronics and power fields. Thermistors will be available following the war.

Problem: Solution:



A PROBLEM facing many plants rearranging equipment to meet shifting production demands is . . . how to quickly and economically get *improved* motor and lighting performance. A *sure* way — one that will save you money, man-hours, long runs of heavy secondary copper—is to install Allis-Chalmers Dry-Type Transformers *right at* load centers!

Because they're 1) small; 2) lightweight; 3) won't drip on anything below, these units go up *anywhere* . . . on posts, beams, overhead platforms, etc. There's *no* insulating liquid to test, filter or change . . . *no* oil fire hazard . . . *no* fireproof vaults needed . . . practically *no* maintenance! Get the full facts *now!* Call or write for Bulletin B6027. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 1804

♪ *Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT.*

ALLIS CHALMERS *Dry-Type Transformers*

THE MORE

THE MORE

B-R-I-G-H-T
FROM END TO END

SPARKLE IN THE POWDER . . .

The greater the care in selection and compounding of phosphor powders for fluorescent lamps, the greater the brightness from the lamp, and the more See-ability the lamp produces in service.

Westinghouse research engineers found, for example, that foreign substances in a batch —*just one part in a million*—make an appreciable difference in light output.

To eliminate these impurities, Westinghouse research has devised new and effective purification processes. A carefully planned and meticulously controlled routine of acid washing, high-temperature firing, grinding, mixing and blending, assures maximum purity and brightness performance in the finished phosphor.

To give your customers better See-ability, recommend bright, long-lasting Westinghouse Mazda Lamps for every lighting application and installation. Westinghouse Electric & Manufacturing Company, Bloomfield, New Jersey.

SEE-ABILITY FROM THE LAMP

WESTINGHOUSE PRESENTS JOHN CHARLES THOMAS • SUNDAY 2:30 EWT., N.B.C. • "TOP OF THE EVENING" • MON. WED. FRI. 10:15 EWT., BLUE NET.

If you sold PROCTOR
DUAL AUTOMATIC TOASTERS
before the war . . .

. . . your sales talk MADE NEWS
with these PROCTOR "firsts":

1. (1929) First silent automatic toaster
2. (1940) First thermostatically controlled pop-up toaster
3. (1941) First dual-automatic toaster—with the crisper!

TOMORROW . . .

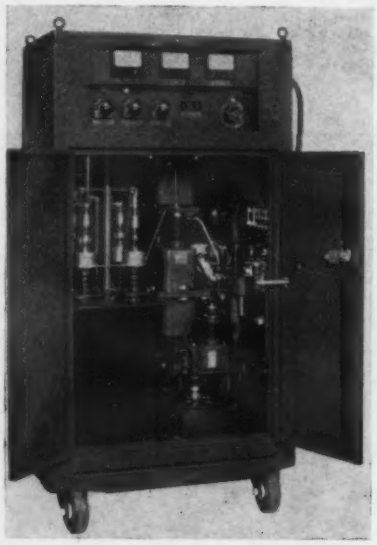
. . . You'll make toaster news again with the still finer Proctor Dual-Automatic—coming—after Victory. Meanwhile let's all *"Back the Attack"* with War Bonds.

PROCTOR

NEWSMAKER IN APPLIANCE MERCHANDISING

PROCTOR ELECTRIC COMPANY—*DIVISION*, PROCTOR & SCHWARTZ, INC.
PHILADELPHIA 40, PENNSYLVANIA.

Power Supply (1203)



General Electric has announced a new line of metal-enclosed high-voltage d-c power supply units in ratings up to 50,000 volts d-c. These units were designed for testing electric equipment, precipitation, induction heating, radio and miscellaneous industrial and electronic applications.

The unit consists of a full-wave kenotron rectifier, a filter to limit voltage ripple to 1% or less, and control equipment, enclosed in a steel cabinet. Dust filters, air circulating fan, automatic solenoid-operated discharge switch, are features in the design.

Capacitors (1204)

General Electric Co. recently announced capacitors made of a synthetic dielectric material called Lectrofilm. This material was developed especially for capacitors from materials available in this country, and is said to have uniform quality and stability under high ambient temperatures. Lectrofilm capacitors are now available in case –60, –65 and –70, which are mechanically interchangeable with mica capacitors CM 60, 65 and 70 as listed in American War Standards Spec. C75.3. The manufacturer states they are well suited for radio-frequency blocking and by-pass applications in communications and other electronic equipment.

Breaker (1205)

Littelfuse Inc. has announced the Breakerette No. 1561, which gives reset protection in circuit breaker form and is interchangeable with 5 AG size fuses or Navy "midget" size. It is rated at 3 to 50 amp., 32 volts a-c or d-c. The snap-action break is capable of interrupting short circuits of 1,000 amp. in ratings up to 5 amp. and 2,500 amp. in ratings over 5 amp. capacity. Unit is 1⅞ in. long, ¾ in. wide. Over-all height with trip shield is 1¼ in. Weight is 15 to 18 gms. It fits into clips on ⅞-in. spacing or more.

Signal Searchlight (1206)

As a "stand-in" for radio communication aboard ship, a signaling searchlight has been developed by Westinghouse. This searchlight flashes its message in code by projecting a beam of light through a series of Venetian-blind shutters that are opened and closed by hand to simulate dots and dashes.

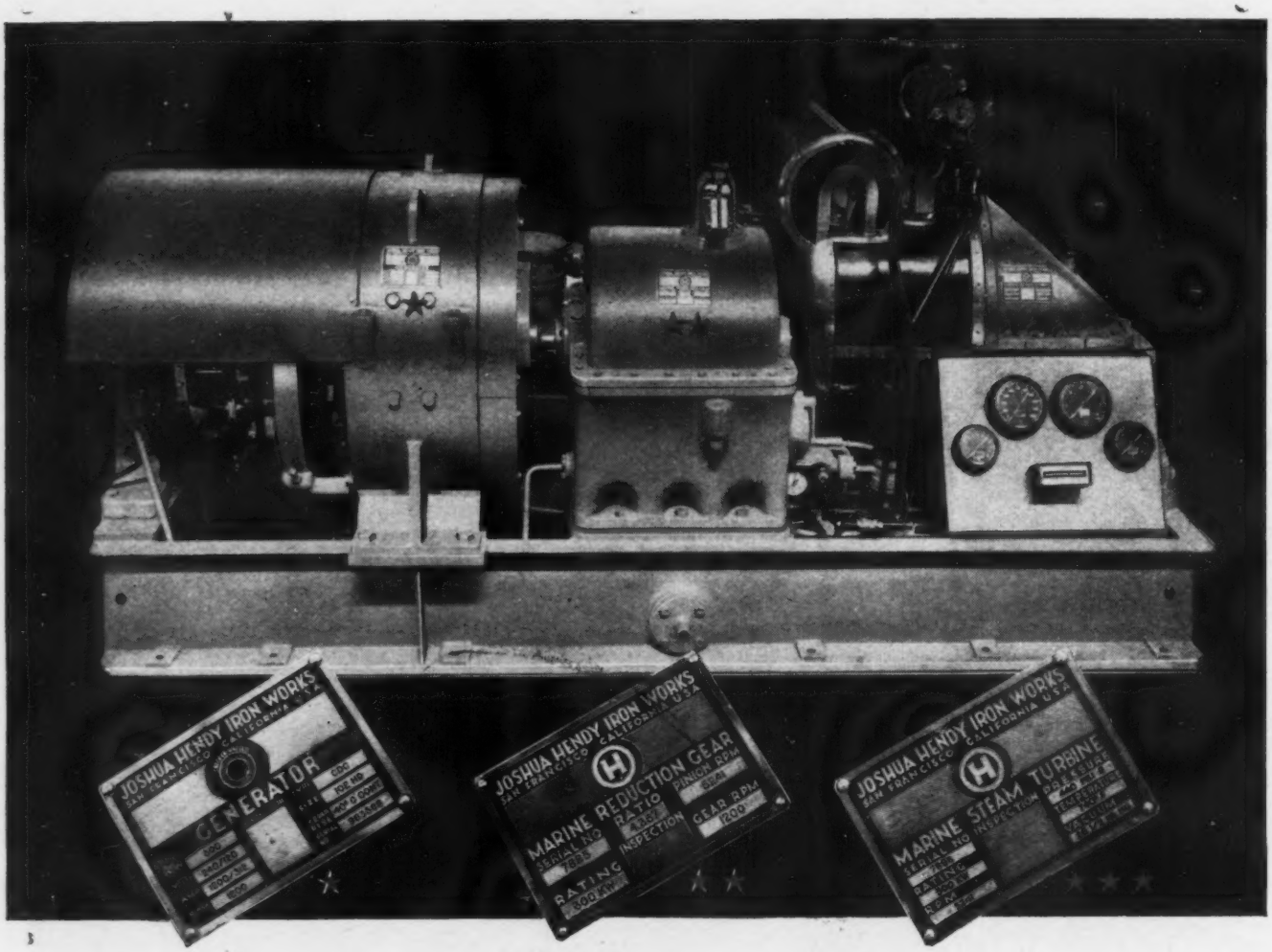
the Birth of the World's Greatest Navy

PEARL HARBOR is a symbol of American bounce. Pearl Harbor December 7, 1941 came as a shock to the nation. Our Pacific fleet, gathered in one harbor, lay helpless under the wings of Japanese treachery.

But from that catastrophe has arisen the mightiest fleet of all history. Sunken, fire-blackened hulks were raised and their weaknesses converted to strength. Pearl Harbor ships, reconditioned in record speed, are mightier than ever. And from the ways of Navy Yards and shipyards all over the United States has come a fleet greater than all other navies of the world combined.

For over half a century Okonite has been a Navy supplier of electrical wires and cables. Okonite research men, cooperating with Navy engineers, pioneered such recent improvements as the synthetic impervious sheath that eliminates heavy coverings of lead, glass fibre insulation that resists heat, flameproof synthetic insulations that replaced rubber, "unilay" assembly of conductors that prevented breakage of copper in flexible cables and Okoloy corrosion-resistant coatings for conductors.

We are justifiably proud of our many contributions that have improved the distribution of electrical power in the ships of our Navy. These same improvements have been incorporated in other cable designs used for power and lighting applications in many other industries. The Okonite Company, Passaic, New Jersey.



A THREE STAR HENDY PRODUCTION

This turbo-generator set was designed as *one complete* power-generation set—not as three separate units. Turbine, reduction gear and generator—all three, Hendy-designed and Hendy-built to give you complete power equipment from one reliable source.

Hendy specifically designed these 250 to 750-kw sets to include many advanced features usually found only in larger turbo-generators. These clean, compact power plants combine strong, modern construction with exceptional simplicity. The usual maze of piping, valves and levers has been eliminated by placing parts in protected locations, leaving neat and trim contours. Appearance is improved—maintenance simplified.

The all-steel turbine allows unusual accessibility and is precision-constructed to assure excellent operating characteristics.

The reduction gear, smooth and clean like the turbine, has its bull gear and pinion mounted in precision-type babbitt-lined bearings to guarantee quiet operation over long periods.

The conservatively rated generator, either a-c or d-c, assures smooth operation because of the unusually close dynamic balance of the armature.

Together, these three matched Hendy-built units form a turbo-generator set completely designed by experienced Hendy engineers, in a range of 250 to 750-kw, to give you the utmost in service for a wide variety of marine or industrial applications.

For complete data write for new catalog on Hendy Type HG-26 Auxiliary Turbo-Generator sets.

JOSHUA HENDY IRON WORKS

ESTABLISHED 1856

SUNNYVALE, CALIFORNIA

Manufacturing Plants: SUNNYVALE, POMONA and TORRANCE in CALIFORNIA • AMPERE, NEW JERSEY • ST. LOUIS, MISSOURI 50-TB-5

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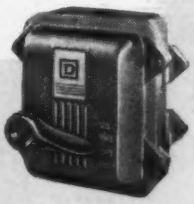
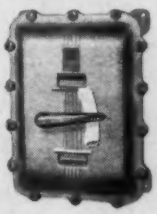
Explosion Resisting ELECTRICAL EQUIPMENT

Industrial Multi-breaker, with arrangements up to 8 single poles, 15-50 amp., 250 volts A.C.

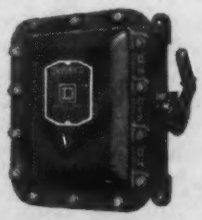


Industrial Circuit Breaker, 15-50 amp., 250 volts A.C. and 125/250 volts D.C., 600 volts A.C. and 250 volts D.C.

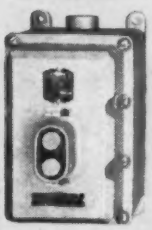


Industrial Circuit Breaker, 50-225 amp., 250 volts A.C. and 125/250 volts D.C., 600 volts A.C. and 250 volts D.C.

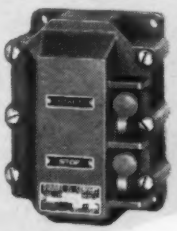
Industrial Circuit Breaker, 225-600 amp. (same voltages).



Type A (not fusible) Switches 30-200 amp., 575 volts A.C., 600 volts D.C.

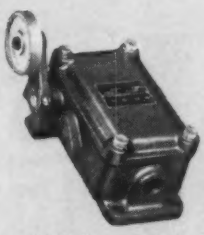


Class 2510 Manual starters for single or three phase motors. Built in NEMA sizes O and I.

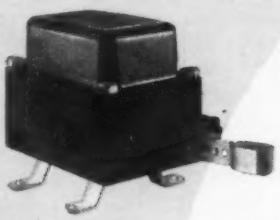


Class 9001 Push button stations up to 4 units heavy duty or 2 units standard duty construction.

Class 8536 Line voltage magnetic starters in NEMA sizes I, II and III for single, two or three phase motors.

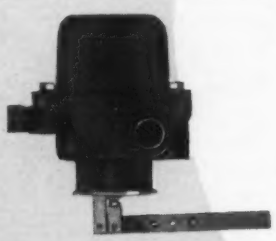


Class 9007 Heavy duty limit switches for control circuit applications.



Class 9048 Float Switch—lever operated. Light duty, standard or reverse operation.

Class 9013 AR Pressure Switch—with or without release valve—available in a variety of ranges and also as vacuum switch.



Class 9037 AR Float Switch—lever operated. Heavy duty. Available in several contact arrangements.

for Class I, Group D Hazardous Locations

Here is a complete line of explosion-resisting electrical control—switches, circuit breakers, Multi-breakers, motor control and regulators. Made of high grade cast iron, Square D Class I Group D explosion-resisting enclosures are built to conform with requirements of the Underwriters' Laboratories, Inc. These housings have closely ground fit between cover and box and are supplied with conveniently located conduit openings.

• • •

For complete information, write to the Square D Company, 1320 E. 16th Street, Los Angeles 21, California

SQUARE D COMPANY

LOS ANGELES • DETROIT • MILWAUKEE

SYLVANIA NEWS
CENTRAL STATION EDITION

DECEMBER *Published in the Interests of Better Sight and Sound* 1944

Plastic Finish for Reflectors Proves Its Superiority

Sylvania reflectors coated with plastic finish emerging from a part of the curing process.

After extensive study of reflector coatings, Sylvania has standardized on a plastic finish of exceptional hardness, flexibility, and light-reflecting efficiency. This finish —*not* an ordinary paint—is produced by the polymerization under a unique heat treatment, of different molecules to form a new chemical compound.

This plastic finish has proved far superior to paint in its resistance to moisture and corrosive vapors. It is more flexible than vitreous enamels, and withstands distortion and bending more successfully.

Judging of Fixture Designs Under Way

All entries are now in for the Sylvania Fluorescent Fixture Design Competition, and the four judges—Howard M. Sharp, Allan E. Parker, C. A. Carpenter and Lurelle Guild—are engaged in selecting the 14 winners.

The judges' decision will be announced in New York on January 19, and will be reported in the February issue of SYLVANIA NEWS. The awards—one prize each of $500, $300, $200, and $100, and 10 prizes of $50 —will be made by Walter Poor, President of Sylvania Electric Products Inc.

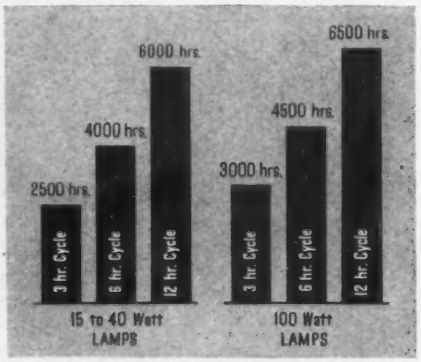
Sylvania Lamp Life Ratings Newly Defined for Longer Time-on Cycles

Permit More Favorable Cost Comparison In Recommending Fluorescent Lighting

A more exact definition of the life ratings of Sylvania Fluorescent Lamps, based on a planned cycle of operation, indicates that public utility representatives, in discussing fluorescent lighting, can now point to the probability of considerably longer lamp life than would have been expected under previously published ratings. Hence preliminary estimates of over-all operating costs can be substantially reduced in many instances, thus placing Sylvania Fluorescent in a more favorable cost position.

BASIS OF RATINGS

Previous life ratings of Sylvania Fluorescent Lamps have been based on a 3-hour burning cycle. In most commercial and industrial applications, the time-on cycle is considerably longer than 3 hours. Since the frequency of starting is of course an important factor, longer time-on cycles will naturally be reflected in longer lamp life.



Comparison of life ratings of Sylvania Fluorescent Lamps for 3-, 6- and 12-hour burning cycles, when burned under specified test conditions.

For this reason, Sylvania has extended its life data to include 6-hour and 12-hour cycles, ratings for which are shown in the accompanying graph. Lighting experts of utility companies will be interested in noting these new ratings, which can be applied in estimating probable lamp replacement costs for new installations.

LIGHTING SHOW TO BE HELD IN APRIL

An event of outstanding interest to utility lighting men—the NEMA International Lighting Exposition—is scheduled to take place in the spring at the Palmer House in Chicago. Dates set for the Exposition are April 19 through 23, 1945.

Sylvania is already completing plans for its participation in this event. According to present plans, Sylvania will be one of the largest exhibitors at the Exposition, with a comprehensive display of lighting products.

Those attending the Exposition are cordially invited to plan to visit the Sylvania booth.

Goodwillie Selected To Aid Utilities in Fluorescent Sales

Sylvania Electric Products Inc. announces the appointment of Mr. Stuart Goodwillie to cooperate with utility lighting departments in promoting sales through better lighting. Mr. Goodwillie, formerly with E. I. Du Pont de Nemours and Trundle Engineering Corporation, will be available for consultation on all lighting sales problems.

SYLVANIA ELECTRIC PRODUCTS INC.
Salem, Massachusetts

MAKERS OF FLUORESCENT LAMPS, FIXTURES, ACCESSORIES, INCANDESCENT LAMPS, RADIO TUBES, CATHODE RAY TUBES, ELECTRONIC DEVICES

35 TONS was the weight of this 1000 kw — 720 rpm — 2400-volt motor-generator set which was . . .

Overhauled . . . in 7 days

TO MEET AN EMERGENCY

This piece of apparatus came into a Westinghouse *Manufacturing and Repair** Plant for general overhauling, including turning and undercutting of the commutator.

To avoid an expensive delay and to dovetail with building plans of the customer, prompt action was required . . . and given.

In just seven days, using the latest approved methods and materials, this motor-generator set was completely repaired, reconditioned and shipped—ready for long, dependable service. This emergency service is typical of many that Westinghouse M & R Plants are rendering today.

Every Westinghouse M & R Plant is part of a nationwide service organization—with local branches as close as your telephone. Factory trained men, using factory methods and equipment, are ready to give you complete, dependable repair service on any type of electrical equipment. J-90551

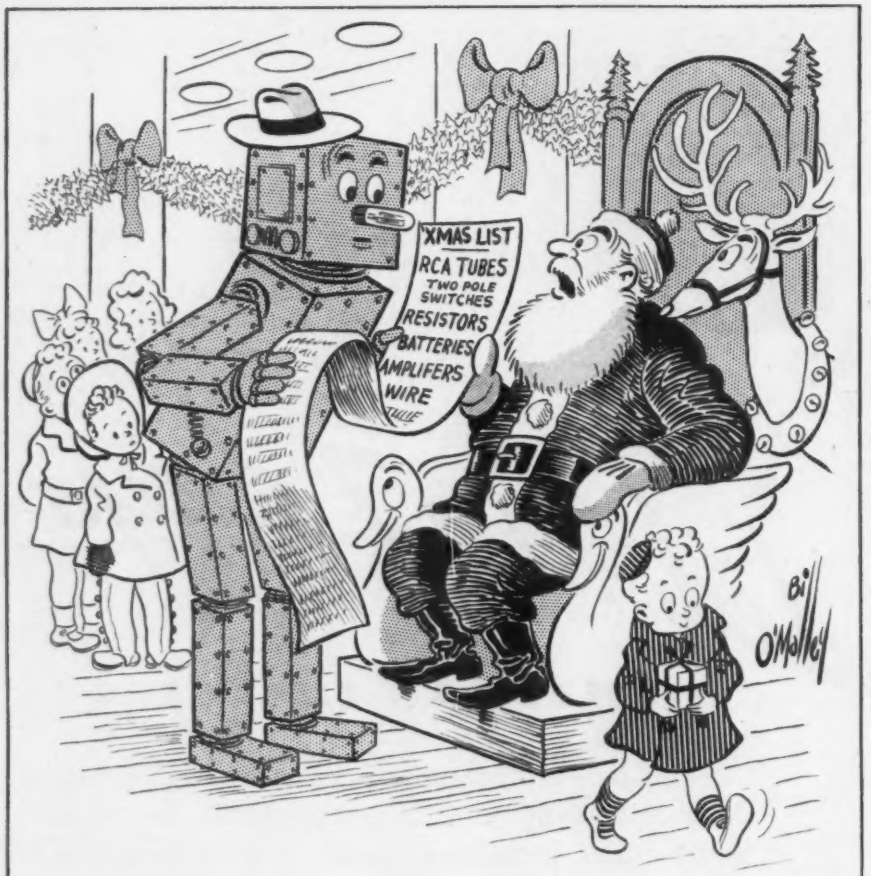
TUNE IN—JOHN CHARLES THOMAS—SUN. 2:30 EWT, NBC • HEAR—TED MALONE—MON. WED. FRI. 10:15 P.M. EWT, BLUE NETWORK

When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU



WHO DO YOU THINK I AM—THE LEO J. MEYBERG CO.?

Delivering a sackful of electric and electronic merchandise is no job for Saint Nick—even a Department Store Santa Claus knows that!

There's an assignment that we're efficiently equipped to handle—in holiday season and out. And we don't take a back-sleigh seat to Santa himself when it comes to delivering the goods. Here at Leo J. Meyberg Co. we've got the broadest range of electric and electronic merchandise this side of the North Pole—well, anyway, west of the Rockies. If we haven't got it right on the shelf we know where to find it and speed it to you.

Other important services to industry on our list include:

Completely engineered industrial sound systems.
Near Infra-Red heating and drying applications.
Industrial lighting.

Save Time, Call Meyberg First!

LEO J. MEYBERG CO.

Incorporated

70 Tenth St., SAN FRANCISCO, 1 TELEPHONE UN 1212
2027 S. Figueroa St., LOS ANGELES, 7 TELEPHONE PR 6011

MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

Mazda Ratings (1207)

General Electric has announced the following life ratings on the Mazda 400-watt AH1 mercury lamp:

Burning Hours per Start	Rated Average Life* (Hours)	% of Initial Lumens per Watt at 70% of Rated Life
5	3,000	87
10	5,000	82

Following are life ratings applying on the G-E Mazda 40-watt F and 100-watt F lamps in white and daylight colors:

Lamp	Burning Hours per Start	Rated Average Life* (Hours)	% of Initial Lumens per Watt at 70% of Rated Life†
40-watt F	3	2,500	84
40-watt F	6	4,000	76
40-watt F	12	6,000	70
100-watt F	3	3,000	78
100-watt F	6	4,500	72
100-watt F	12	6,500	69

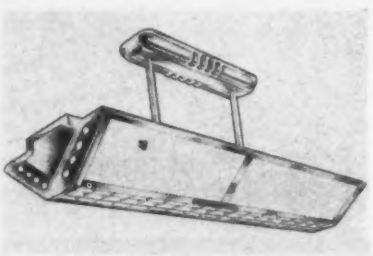
* Under specified test conditions.
†All fluorescent lamps depreciate in light output continuously throughout life. For most services, use of F lamps beyond 6,500 hours cannot be economically justified.

Slimline Tube (1208)

Westinghouse Lamp Division has announced that it will manufacture a new type "slimline" fluorescent tube as soon as conditions permit. These hot-cathode fluorescent lamps were developed primarily for showcases, wall cases and coves in stores, restaurants and wherever a long, slim light source is desired. They are designed to operate on either 100 or 200 ma. to produce 60 lumens per watt, and will be available initially in standard white and in 42-, 64-, 72- and 96-in. over-all lengths. Bulb diameters range from ¾ in. in the case of the 42- and 64-in. lengths to 1 in. for the 72- and 96-in. lengths. The 60-in. standard F-lamp, longest heretofore made by Westinghouse, had a diameter of 2⅛ in. Life rating will be the same as the standard 40-watt fluorescent lamp.

Lighting Fixture (1209)

Day-Brite Lighting Inc. is now making the Coronado all-steel commercial lighting fixture. This unit is a four-light 40-watt fixture of the shielded type for surface and suspension mounting. It features a snap on enclosure for convenience in servicing.



Measuring Device (1210)

Reiner Electronics Co. has a new model vacuum tube volt-ohm-milliammeter. According to the manufacturer, it has a wide-frequency range a-c voltmeter, which measures from 50 cps. to 50 megacycles, six d-c voltage ranges, with input capacitance of less than two micro-microfarads and input resistance of 11 megohms all ranges; d-c current ranges from 50 microamperes to 1 amp. in six ranges.

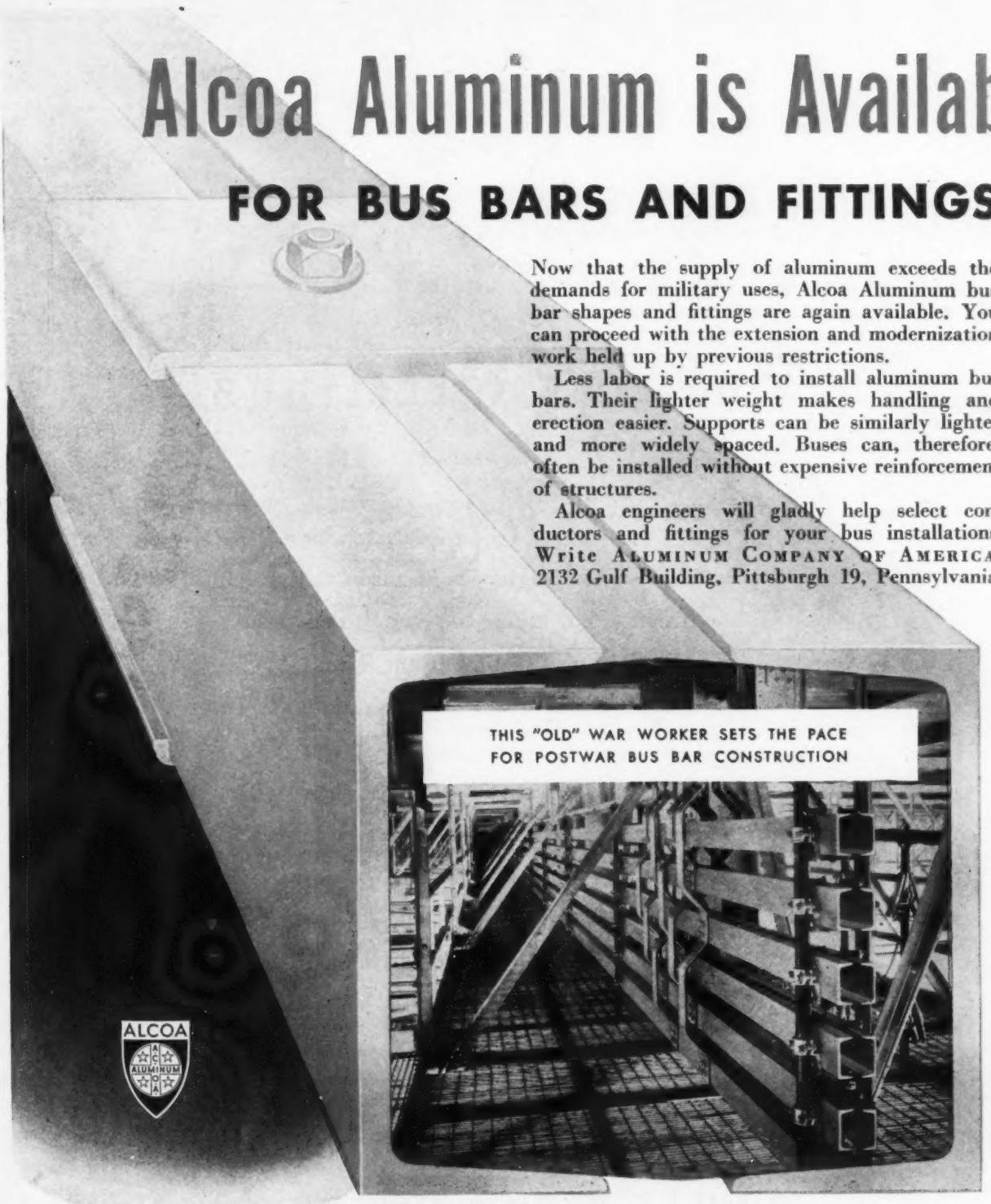
Alcoa Aluminum is Available

FOR BUS BARS AND FITTINGS

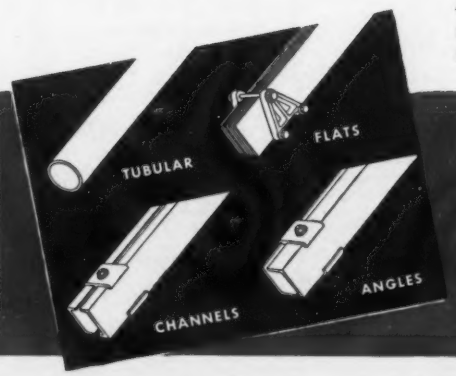
Now that the supply of aluminum exceeds the demands for military uses, Alcoa Aluminum bus bar shapes and fittings are again available. You can proceed with the extension and modernization work held up by previous restrictions.

Less labor is required to install aluminum bus bars. Their lighter weight makes handling and erection easier. Supports can be similarly lighter and more widely spaced. Buses can, therefore, often be installed without expensive reinforcement of structures.

Alcoa engineers will gladly help select conductors and fittings for your bus installations. Write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.



The idea of using structural shapes for electrical conductors was originated by Aluminum Company of America; better ventilation and higher efficiency, rigidity and strength of a girder. This first installation of channel bus bars, installed in 1928, has a run of 1,600'. Conductors are 5" Alcoa Aluminum channels.



ALCOA
ALUMINUM

Season's Greetings

As we draw near to the close of a year made difficult by the confusion of global war, we pause to extend the Season's Greetings to our friends and customers and to express our gratitude to those who have been so patient and understanding during the months when we could not give them the Simplex service to which they were accustomed. We sincerely hope that the new year may bring peace to our war-weary world and to each of you a large measure of health, happiness and prosperity.

SIMPLEX WIRE & CABLE CO.

79 Sidney Street, Cambridge 39, Mass.

Here's Why Wagner

POLE-TYPE DISTRIBUTION TRANSFORMERS

Assure users of the utmost convenience and economy of operation

1 Core and Coils of improved design and construction with high-quality materials give high efficiency and low operating costs.

2 Diagram nameplate gives full information. Nameplate pad extends below nameplate to provide space for attaching users' data.

3 Support lugs of heavy bar-iron electrically welded to the tank are designed for direct-pole mounting. Upper lugs are provided with two jump proof lips. When crossarm mounting is desired, T-crossarm hanger-irons can be bolted to these brackets.

4 High voltage pocket-stud-type bushings of wet-process porcelain are co-ordinated with the winding insulation of the transformers so that line surges will flash over the bushings on the outside of the tank. Clamp-type connector gives ease of connection. The porcelain bell extending over the connector provides added safety. High- and low-voltage bushings are securely clamped in position by a keeper-plate and spring.

5 Pocket is made of copper-bearing sheet-steel electrically welded to the tank.

6 Rotary-type ratio-adjuster dial extends above the oil level. A pointer clearly indicates the ratio connected.

7 Domed cover of extra-heavy, press-formed, copper-bearing steel.

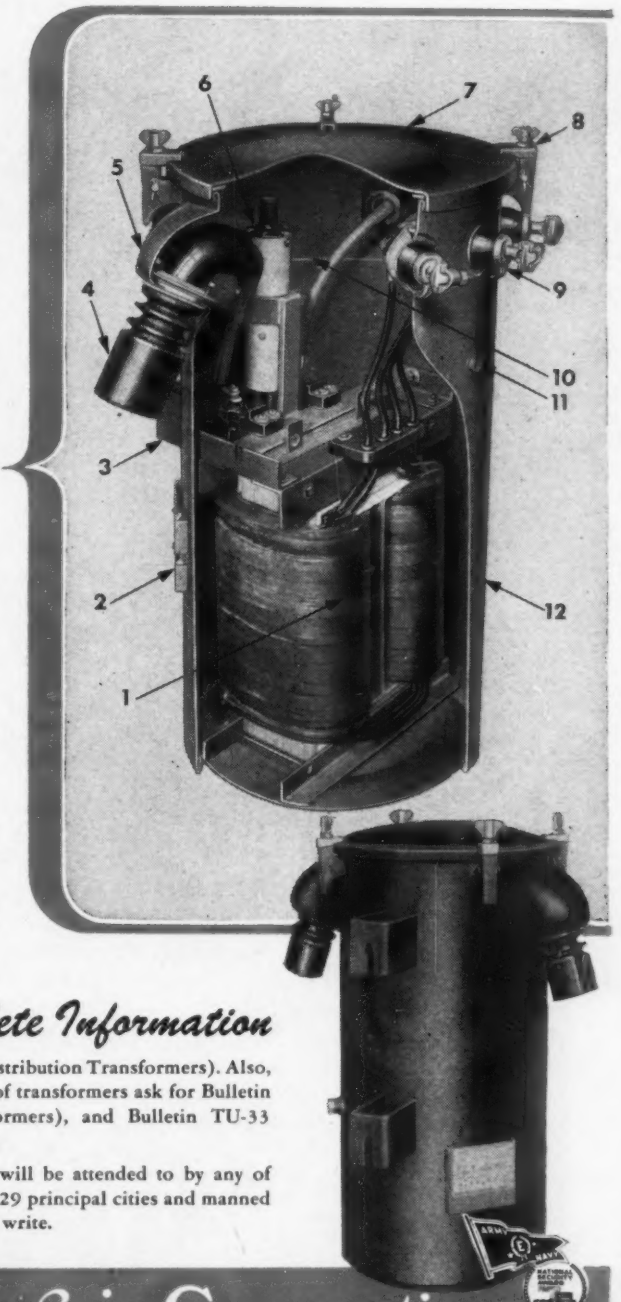
8 Cover clamping-assembly consists of a hot-galvanized wing-nut, bolt and clamp. The lower portions of the cover-clamps also serve as lifting-lugs on sizes 1½ to 10 kva.

9 Individual low-voltage stud-bushings of wet-process porcelain are properly coordinated with the winding insulation of the transformer. These bushings are of the removable type and are provided with solderless connectors.

10 Oil level clearly indicated.

11 Tapped pad suitable for attachment of solderless connector for grounding low-voltage neutral or for grounding of tank.

12 Tank is made of copper-bearing sheet-steel. Bottom is recessed to provide maximum protection while handling. Upper edge is rolled for added strength and to provide wide cover-gasket seat.



TRANSFORMERS
are but one of several
WAGNER PRODUCTS

Other WAGNER PRODUCTS:
AIR BRAKES
•
BRAKE LINING
•
HYDRAULIC BRAKES
•
INDUSTRIAL BRAKES
•
INDUSTRIAL BRAKE CONTROLS
•
TACHOGRAPH (Recording Speedometer)
•
ELECTRIC MOTORS

T44-15

Write for Complete Information

Ask for Bulletin TU-51 (Wagner Distribution Transformers). Also, if you are interested in other types of transformers ask for Bulletin TU-181 (Wagner Power Transformers), and Bulletin TU-33 (Wagner Noflamol Transformers).

Needs for immediate information will be attended to by any of Wagner's branch offices, located in 29 principal cities and manned by trained field engineers. Wire or write.

Wagner Electric Corporation

ESTABLISHED 1891

6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

ELECTRICAL AND AUTOMOTIVE PRODUCTS

known Performance

for destinations known or unknown

Today, our electrical equipment encircles the globe; some serving at Greenland's ice cap or in Kiska's fogs . . . others stewing in the swamps of a Pacific atoll.

With the destinations of war-products totally unknown, manufacturers logically have preferred "building-in" WESTONS on their control panels. They know that a WESTON will perform dependably *anywhere* . . . that there is sound reason behind WESTONS acceptance as the *international standard.*

And tomorrow, with equipment reaching known markets, instrument preferences will remain unchanged. For while human life no longer will be at stake, *reputations will.* So manufacturers will continue to "build-in" the instruments which consistently tell-the-truth . . . to build broader market acceptance and customer good-will, and assure highest efficiency from the machines which bear their name.

- Laboratory Standards
- Precision DC and AC Portables
- Instrument Transformers
- Sensitive Relays
- DC, AC, and Thermo Switchboard and Panel Instruments
- Specialized Test Equipment
- Light Measurement and Control Devices
- Exposure Meters
- Aircraft Instruments
- Electric Tachometers
- Dial Thermometers

Weston

WESTON ELECTRICAL INSTRUMENT CORPORATION
577 FRELINGHUYSEN AVENUE, NEWARK 5, NEW JERSEY

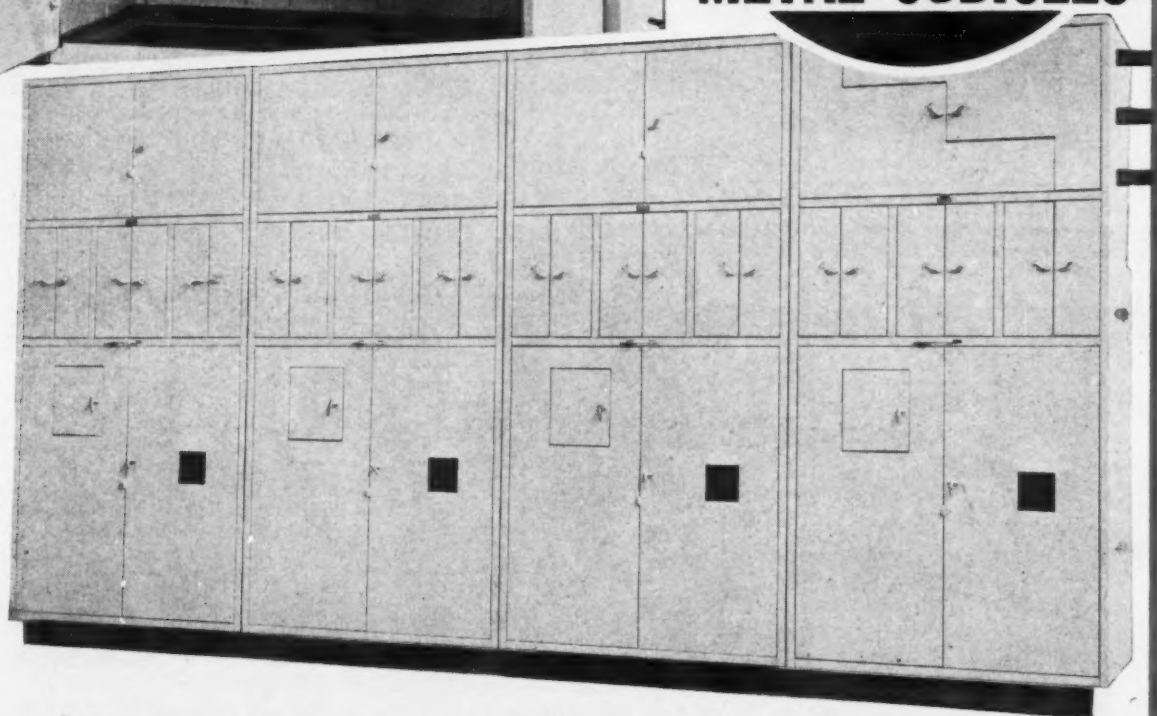
FOR OVER 55 YEARS LEADERS IN ELECTRICAL MEASURING EQUIPMENT

CHECK the FACTS

OPEN SECTION—of right hand panel shown below.
Features—rigid welded frames; flanged beaded edge doors with wide angle hinges,—special, resilient metal bus support construction, well fitted, neat appearance.

1. Your requirements are individual problems. . . .
   We build what you want.
2. R&IE is especially capable of furnishing the custom job.
3. We have complete facilities—Engineering talent, manufacturing experience, foundry, machine and steel shops—all under one roof.

R&IE METAL CUBICLES



GARLAND-AFFOLTER ENGINEERING CORP.

The Check List

- CONDUCTOR SUPPORT CLAMPS AND FITTIN
- DISCONNECTING SWITCH INDOOR AND OUTDOOR
- AIR BREAK SWITCH
- INTERRUPTER SWITCH
- CUTOUTS AND THERMO-RUPTERS
- SWITCH OPERATIN MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSE
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SECTIONALIZING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICE

SAN FRANCISCO
LOS ANGELES
SEATTLE
PORTLAND

A NAME TO REMEMBER

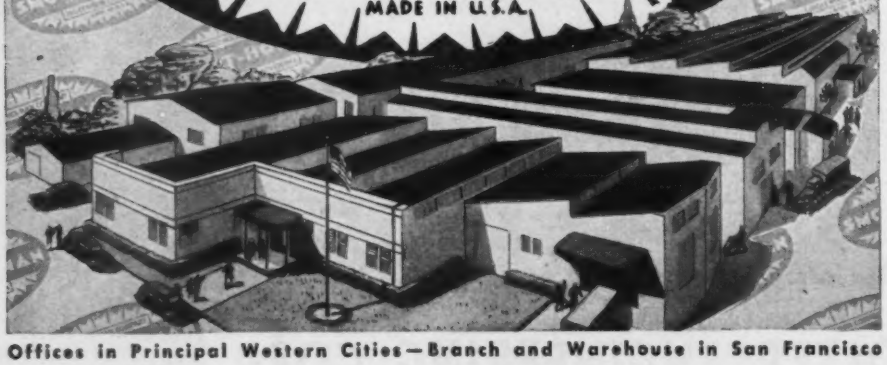
When production restrictions are finally lifted, remember the nationally known name of Smoot-Holman. Then as now, it will stand first and always for QUALITY in lighting equipment, conveniently available throughout the west.

SMOOT-HOLMAN COMPANY

SMOOT-HOLMAN

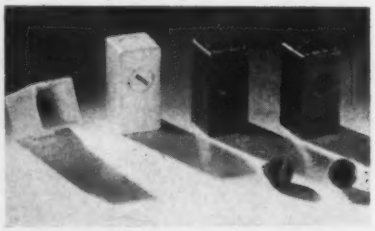
INGLEWOOD, CALIFORNIA

MADE IN U.S.A.



Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Connectors (1211)



For convenience in wiring, replacements and trouble shooting, H. B. Sherman Mfg. Co. has adopted a color code for its fixture connectors. Vinylite red plastic is used for the fixture on the "hot" wire; white plastic for the ground wire.

A-C Generators (1212)

Electric Machinery Mfg. Co. is building a new line of high-speed a-c generators in sizes 18.7 to 125 kva., 1,800 to 514 rpm. These units are for standard voltages, one, two or three phase, 50 and 60 cycles, 80% power factor, 50° C or 40° C rise. They are supplied as two-bearing units for belted or coupled duty, or single-bearing for direct coupling to drive. They are available also as packaged units.

Transformers (1213)

Acme Electric & Mfg. Co. announces that it is now making its air-cooled transformers with pressed steel end covers, instead of steel castings, reducing the weight an average of 22%, and over-all dimensions as much as 4½ in. The new design covers types from 1 to 15 kva. with primaries up to 2,400 volts. Rated output is not affected, and temperature rise remains at 55° C, the manufacturer states.

Timer (1214)

A combination reminder and kitchen clock has been designed by the Warren Telechron Co. and will be available as an assembly for appliance mounting or for use as an accessory. When supplied as an assembly, this timer can be set for intervals up to 3½ hours. It is operated by a 2-watt synchronous motor and can be furnished in 115 or 220 volt in any standard commercial frequency.

Resistance Thermometer (1215)

Bailey Meter Co. is making an electronic type resistance thermometer, which it claims is suitable for indicating, recording and controlling temperatures between —100° F. and 1,000° F. It operates on the null balance principle; balancing action is provided by electronic detection and control; unbalance is detected by electron tubes.

Fitting (1216)

Killark Electric Mfg. Co. has announced a two-ring thin wall conduit fitting. These fittings are available in all hub combinations and for conduits of ½ to 2 in.

Wax Mixer (1217)

Aeroil Burner Co. has an electrically heated hot wax dripping and melting tank. Called the Waxmaster Major, the tank has a 70-gal capacity.

CHOOSE G-E SERVICE ENTRANCE CABLE

(TYPE SE)

- *Economical*
- *Safe*
- *Easy to Install*

APPROVED BY THE UNDERWRITERS'

Use this sturdy, tough cable from entrance caps to meter equipment. It can be installed directly on the outside of buildings without conduit protection. It is flexible—can be bent edgewise without damaging the conductors. It is compact, light in weight and requires only the simplest of fittings.

G-E service entrance cables consist of one or more Type R insulated conductors and a concentrically-applied stranded bare conductor. The conductors are protected by a heavy, watertight, weatherproof over-all covering. These cables are also available with flat, galvanized steel armor wound spirally under the outer covering.

FOR FURTHER INFORMATION on G-E service entrance cable or building wires or wiring devices, see the nearest G.E. Merchandise Distributor or write to Section CDW1243-18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

BUY WAR BONDS AND HOLD THEM

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. EWT, CBS.

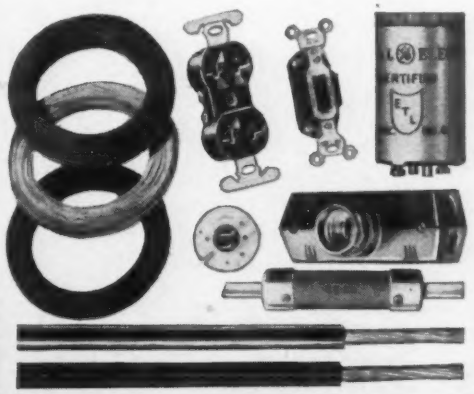
FOR COMFORTABLE LIVING AND INVESTMENT PROTECTION

On adequate wiring Philip A. Benson, president of The Dime Savings Bank of Brooklyn, N. Y., says, "We shall require adequate wiring in the new post-war homes that we finance, not only as a guarantee of comfortable living for the mortgagor, but also as a measure of protection for our investment."

ADEQUATE WIRING SERVES AND SAVES — THE KEY TO THE HOME OF TOMORROW

G-E BUILDING WIRES AND WIRING DEVICES

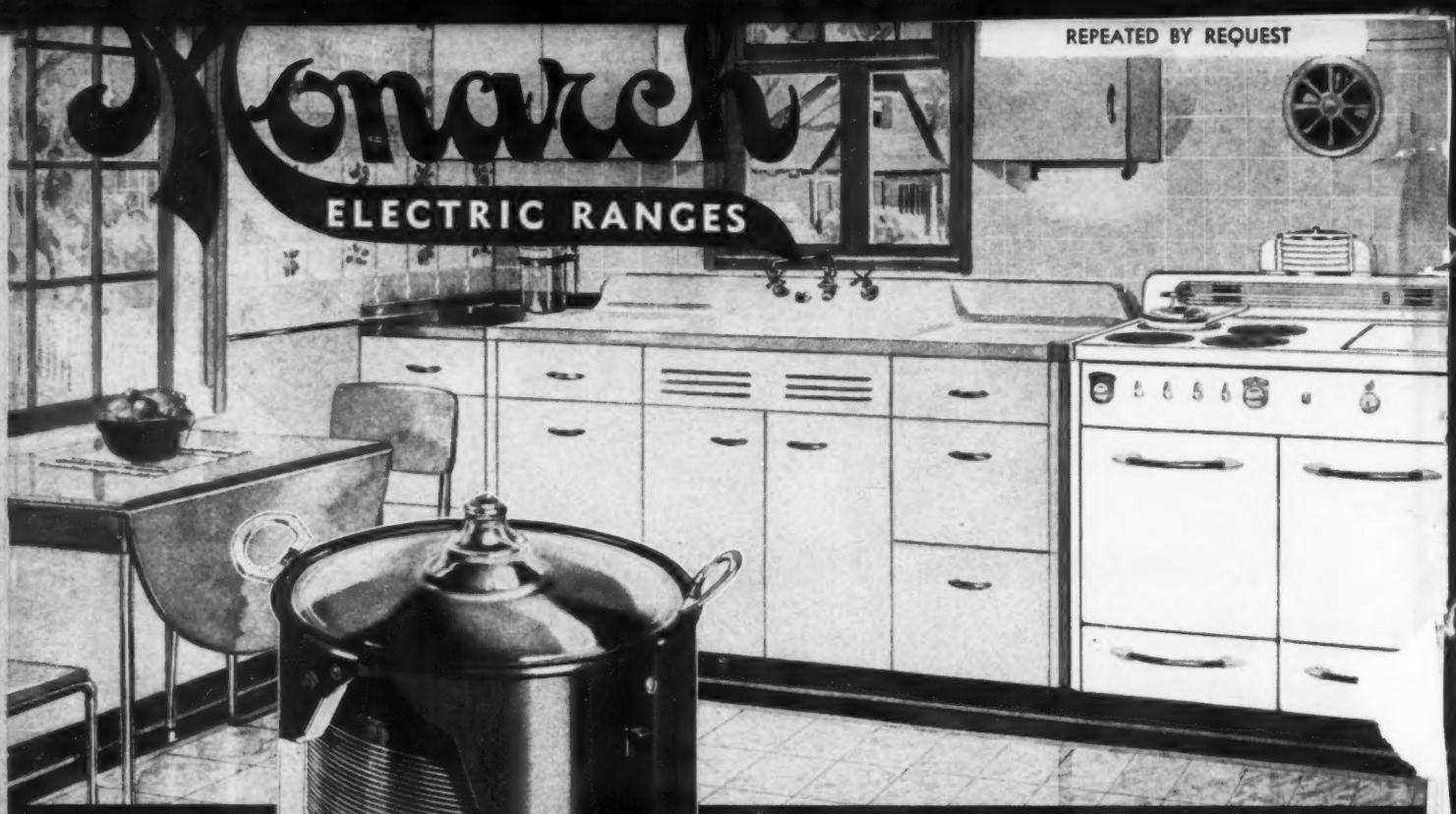
General Electric offers building wires and wiring devices for every purpose including Type SN and Type SNW small diameter Flamenol* Building Wire and hundreds of wiring devices—switches, lampholders, outlets, etc.
*Reg. U.S. Pat. Off



GENERAL ELECTRIC

REPEATED BY REQUEST

Monarch
ELECTRIC RANGES



"SIDE-HEET" APPLICATION →

Higher Cooking Efficiency for the Post-War Kitchen!

Yes, you can even bake a cake in the Monarch Surface Oven.

A 2½ lb. whole chicken, or 5 lbs. of jointed chicken, can be roasted to a tender brown.

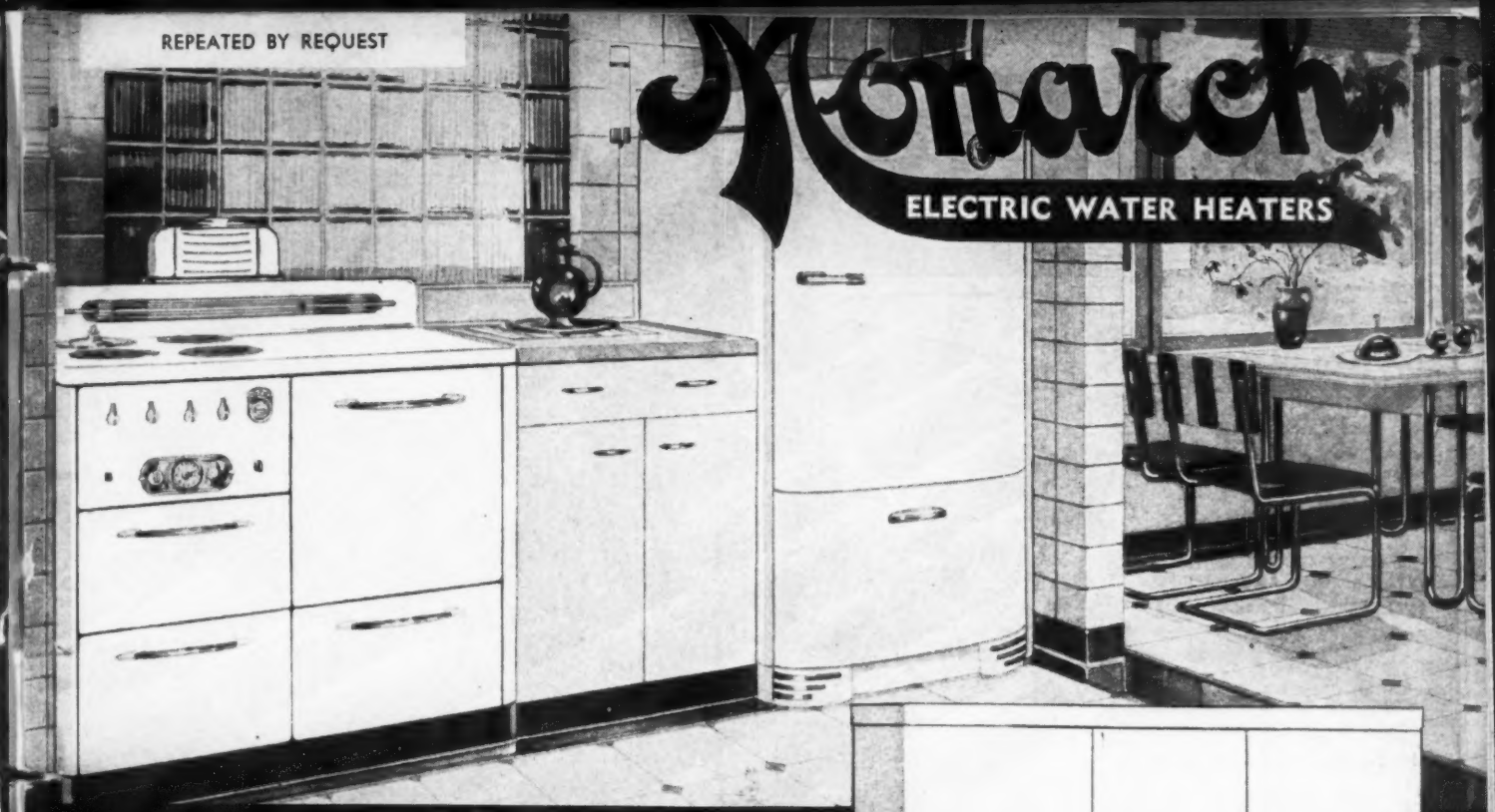
Sauerkraut and spare-ribs is a "natural". "Side heet" browns ribs while sauerkraut steams.

If "weenies" are preferred with sauerkraut, here's a clever way to do it.

These cooking "miracles" performed in the Monarch Surface Oven are made possible by *side application* of heat — which is another one of the many exclusive features Monarch dealers will have to offer as soon as Electric Ranges are again on the market. Now is a good time to make sure that *YOU* have the selling advantages of Monarch's many exclusive features with a MONARCH exclusive franchise.

MALLEABLE IRON RANGE CO.
3294 Lake St. Beaver Dam, Wis.

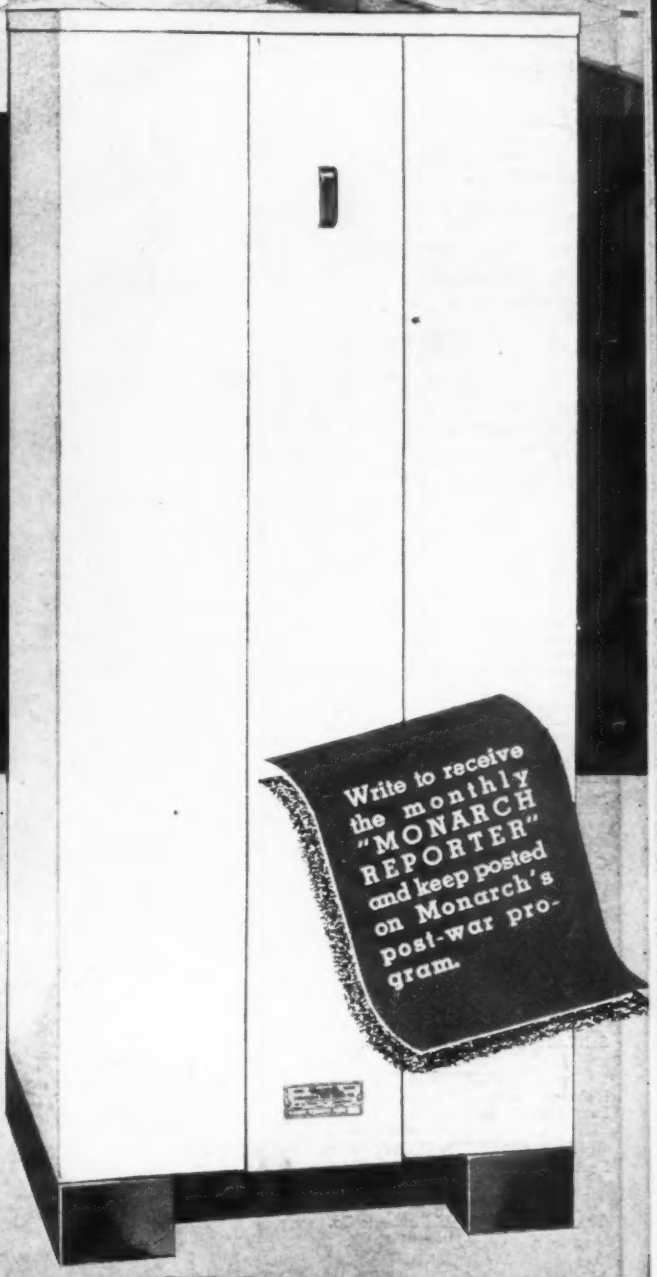
REPEATED BY REQUEST



Monarch

ELECTRIC WATER HEATERS

Extra Profits for the Monarch Dealer!

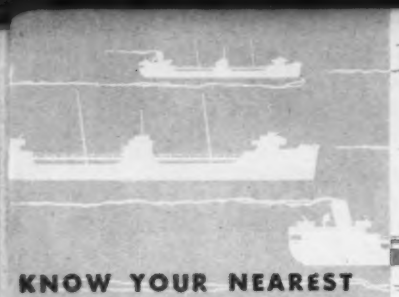


Electrically heated water in the post-war kitchen will go hand in hand with electric cooking. Which means that you, as a Monarch dealer, can make *two* sales instead of one, *two* profits. Check with the factory now and get lined up on your Electric Water Heater franchise.

MALLEABLE IRON RANGE CO.

3294 Lake St. Beaver Dam, Wis.

KEEP THE ENTIRE FAMILY IN HOT WATER



KNOW YOUR NEAREST BLAW-KNOX DISTRIBUTOR

ALABAMA
Birmingham—McConnell Sales & Engineering Corp.

CALIFORNIA
Los Angeles—E. M. Ornitz
San Francisco—W. S. Wetenhall Co.

COLORADO
Denver—Mine & Smelter Supply Co.

DISTRICT OF COLUMBIA
Washington—Meleney Engineering Co.

GEORGIA
Atlanta—Evans L. Shuff

INDIANA
Indianapolis—Hugh J. Baker & Co.
South Bend—Edwards Iron Works, Inc.

IOWA
Des Moines—Delevan Engineering Co.

LOUISIANA
New Orleans—Arthur C. Hays

MARYLAND
Baltimore—H. T. Potts Co.

MASSACHUSETTS
Boston—Brown-Wales Co.
Holyoke—Massachusetts Supply Corp.

MICHIGAN
Detroit—Wm. P. Favorite

MINNESOTA
St. Paul—Robert J. Wylie

MISSOURI
Kansas City—W. R. Fithian
St. Louis—Rhodes Equipment Co.

NEW JERSEY
Essex Fells—Paul G. Koch

NEW YORK
Albany—Edwin D. Shultz
Buffalo—Reecon Company, Inc.
Syracuse—George Rees

OHIO
Cincinnati—Wyman Engineering
Cleveland—H. W. Kaiser Co.
Columbus—F. L. Purdy Co.
Toledo—George J. Haase

OKLAHOMA
Tulsa—Frick-Reid Supply Corp.

PENNSYLVANIA
Altoona—Altoona Pipe & Steel Supply Co.
Philadelphia—H. T. Potts Company

SOUTH CAROLINA
Greenville—Edward McCrady

TENNESSEE
Bristol—J. G. Tilley
Memphis—Pidgeon-Thomas Iron Works

TEXAS
Houston—James A. Hall

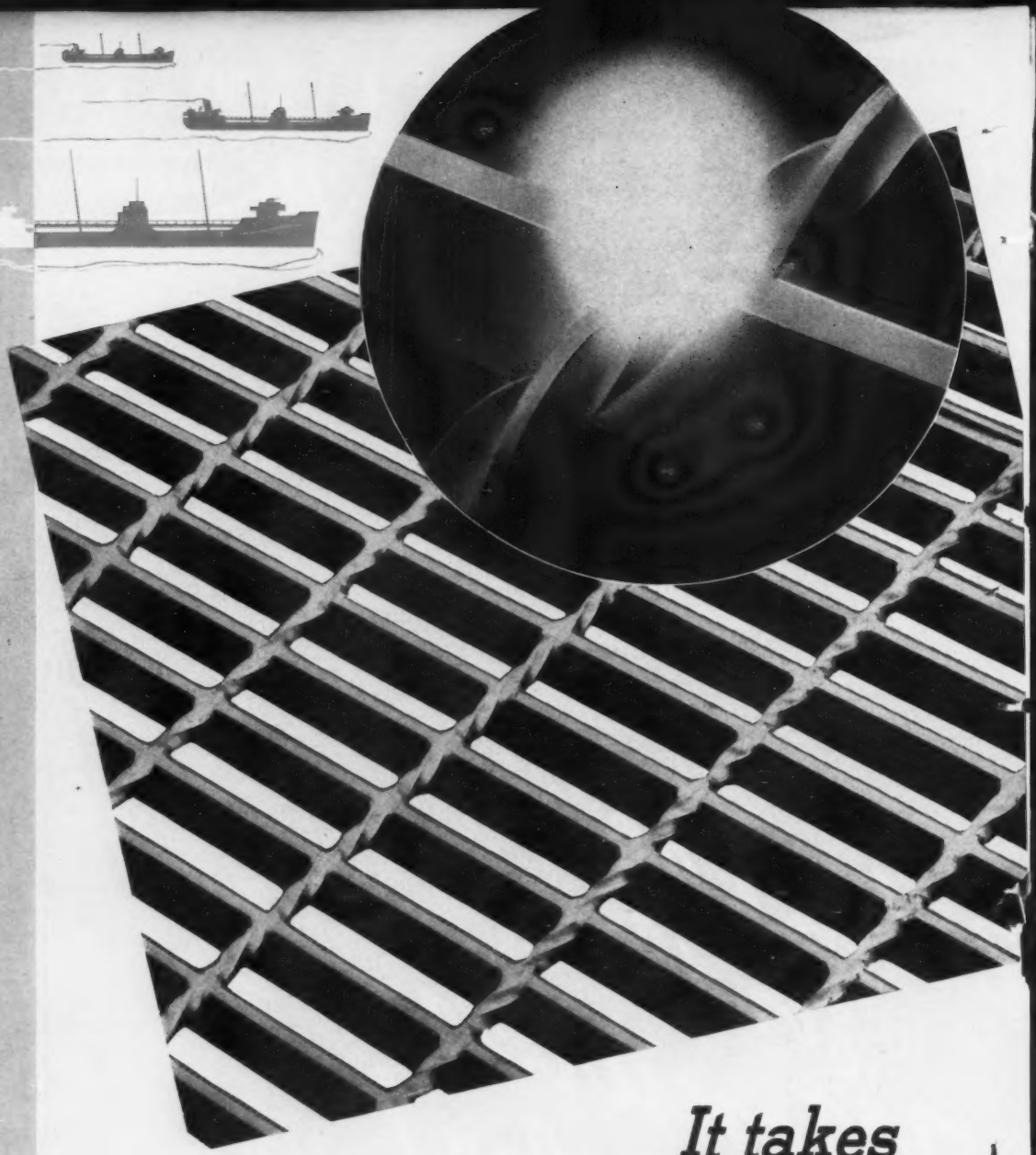
UTAH
Salt Lake City—Harrison & Co.

VIRGINIA
Richmond—W. H. Trausneck
Roanoke—Milliken Co.

WASHINGTON
Seattle—Geo. Montgomery

WEST VIRGINIA
Charleston—Fireproof Products Co.

WISCONSIN
Milwaukee—Hunter Tractor & Machinery Co.



It takes ELECTROFORGING *to make a real catwalk*

A pitching ship and a greasy boot have accounted for many a casualty at sea. So, for the utmost in safety specify the TWISTED BAR of Blaw-Knox grating on catwalks and all open flooring.

- ★ One-piece electroforged steel construction for maximum strength!
- ★ Easy maintenance — paint reaches entire surface!
- ★ Maximum open area for light and air!
- ★ Self-cleaning — no sharp corners to clog with dirt!
- ★ Economical and easy to install — cut to fit your specifications!

BLAW-KNOX DIVISION of Blaw-Knox Co.
2093 Farmers Bank Bldg., Pittsburgh, Pa
OFFICES IN PRINCIPAL CITIES

BLAW-KNOX STEEL GRATING

AN OUTSTANDING WESTINGHOUSE CONTRIBUTION TO GREATER CONTINUITY OF POWER SERVICE

Multi-Flow "De-ion Grids"

. . . make 5-cycle breakers Standard . . . and Smaller

Twenty years ago, no one could specify the exact interrupting speed of a power circuit breaker. Why? Interrupting time of high voltage breakers varied from 20 to 40 cycles. Breakers were rated on a 2-minute duty cycle . . . contact maintenance was necessary after a few interruptions . . . fast reclosing was not practical.

In 1930, Westinghouse introduced the "De-ion Grid". It revolutionized arc interruption, soon making 12-cycle breakers (and later 8-cycle) the accepted standard. Faster clearing of faults meant greater system stability, more efficient use of transmission and distribution lines . . . reduced maintenance expense on breakers.

In January, 1944, Westinghouse announced a 5-CYCLE breaker for 115 kv and above... rated on a 15-second duty cycle, suitable for very fast reclosing, and smaller than previous breakers.

In just 20 years, through painstaking research in the laboratory and the field, Westinghouse is proud to have played a leading part in reducing circuit breaker opening time 75% . . . duty cycle from 2 minutes to 15 seconds . . . maintenance cost . . . and size and weight materially . . . while maintaining ruggedness. Westinghouse Electric & Manufacturing Company, Dept. 7-N, East Pittsburgh, Pa.

J-97085

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

CENTRAL STATION EQUIPMENT

J. B. MacNeill, Manager of the Switchgear and Control Division, and his associates have given the industry another far-reaching circuit breaker development—the new 5-Cycle Type GM Breakers, for systems 110 kv and above.

SMALLER than the 8-cycle breakers it supersedes, the GM requires less oil, less oil handling, and smaller foundations . . . but retains equivalent ruggedness.

The Starter that

Clicked With the Trade!

Lloyd New Automatic Starter

In the *New* RED PLASTIC Can

Tomorrow's Starter Today!
New! Distinctive!
Listed and Approved by Underwriters' Laboratories, Inc.
Submitted to Electrical Testing Lab., Inc., for certification.

Pat. Nos. 2200443—2228210

Locks Out . . . Resets AUTOMATICALLY

1. Positively cuts out deactivated, flickering, blinking lamps.
2. When trouble is detected the starter automatically cuts off current to the ballast and lamp.
3. Gives long life to ballast because defective lamp is locked out. Prevents overheating.
4. When Lloyd AUTOMATIC locks out defective lamp—turn off the current—Remove defective lamp—Put in a new lamp.
   Allow at least one minute to make the above change of lamps. Turn on the current. The starter automatically lights the new lamp.
   NO NEED TO DO ANYTHING TO THE STARTER
5. Lloyd NEW PLASTIC CAN has higher dielectric strength, is stronger, lighter, distinctive.
6. Knurled rim on plastic can insures positive grip for insertion and removal of starter.
7. Plastic can is sealed. No projecting lugs to cause trouble.
8. The life of the AUTOMATIC starter is many times greater than that of the average lamp.
9. It saves maintenance costs and power consumption, protects and insures longer life to the ballast and lamp.
10. Tested in production and prior to shipment to insure perfect performance.

LLOYD PRODUCTS COMPANY
Dept. EW-12 Providence 5, R. I.
Representatives in 23 Leading Cities.
Export Office: 13 E. 40th St., N. Y. C.

Analyzer (1218)

Cole Instrument Co. is manufacturing a d-c industrial analyzer, said to have ranges necessary for testing d-c motors from ½ to 600 hp. and industrial and marine electrical generating and distribution equipment or control devices.

Lead Wire (1219)

General Electric Co. is manufacturing a new Deltabeston Flamenol thermo-plastic insulated lead wire for use in all types of fluorescent lamp ballasts. It has the approval of Underwriters' Laboratories for use as lead wire in lighting fixtures where 600-volt service is required and for 176° F. Insulation is said to be superaging and resistant to flame, oils, acids, alkalies. Available in solid and stranded conductors, sizes 16 and 18 AWG in black, white, red and green.

Terminator (1220)

A horizontal cable terminator incorporating a special sealing head has been added to the O.Z. line. This terminator is for use with single or multiple cables up to 750 volts and for lead, rubber or braided covered cable. It can be furnished in malleable iron, bronze or aluminum for conduits 1 to 6 in. A pressure bushing on the head compresses split rubber rings placed around the cables between two canvas bakelite discs, thus sealing the fitting.

Electrode (1221)

A high-tensile arc welding electrode, Type W-55, has been developed by General Electric for fabricating aircraft steels. This electrode can be used for welding in any position. The company recommends it for operation on direct-current straight polarity or alternating current and suggests a medium long arc for best results. Available in three sizes: 3/32 x 12 in.; 1/8 x 14 in.; 5/32 x 14 in.

Relay (1222)

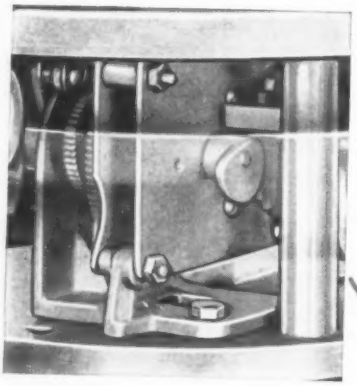
H-B Electric Co. has redesigned its mercury plunger relay to include a crown-shaped wire guide, which it claims keeps the plunger upright and friction free, resulting in a faster, cleaner break without mercury splash or a prolonged arc. The new relays are of the normally open series, available for a-c up to 440 volts and d-c to 250 volts, with contact capacities as high as 30 amp.

Available in December

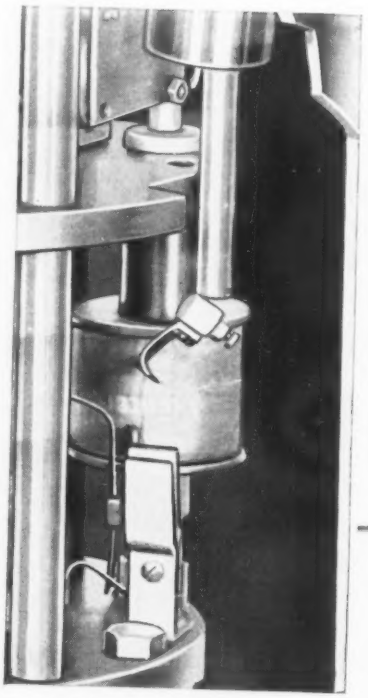
With Exclusive Features developed by KEARNEY ENGINEERS

KEARNEY'S O·C·B

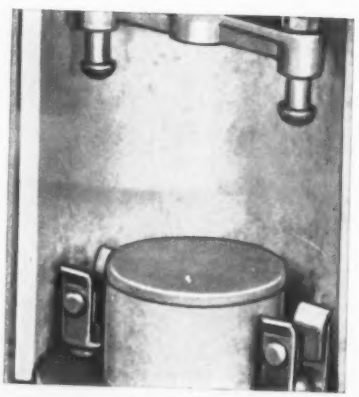
TIME DELAY MECHANISM. The escapement type time delay is a special feature. Its functioning is entirely independent of temperature or oil viscosity. Its operation is as regular and certain as a high grade clock mechanism. A flexible choice of operations is available making possible a coordination with fuse links that is not readily obtainable with the usual OCB's. Choice of 4 fast, 4 slow or any combination of fast and slow operations up to 4 are factory set to meet the requirements of your system.

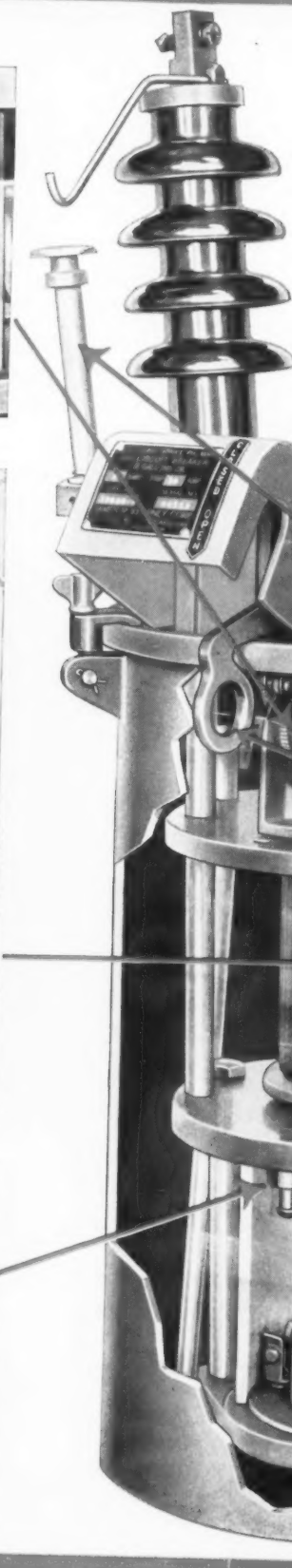


TRIP-COIL RELAY. A new principle is employed for the first time in pole mounted OCB's for controlling the opening mechanism. A Trip-coil of 5, 10, 15, 25 or 50 amperes rating as selected, is the means of eliminating pumping and accurately controlling the opening of the breaker. The Trip-coil carries the line current until a fault current causes its operation. At this time the full fault current is impressed on the actuating coil causing it to act instantaneously and to positively open the circuit. Thus chattering, or pumping, is eliminated. Lower line losses result because the low impedance Trip-coil carries the line current instead of the usual method of carrying line currents through high impedance actuating coils. Further protection against lightning is provided by placing a gap across the terminals of the Trip-coil so that steep wave front lightning surges will be harmlessly discharged without damage to the Trip-coil. Hence, double protection against lightning damage is built into the Kearney OCB.



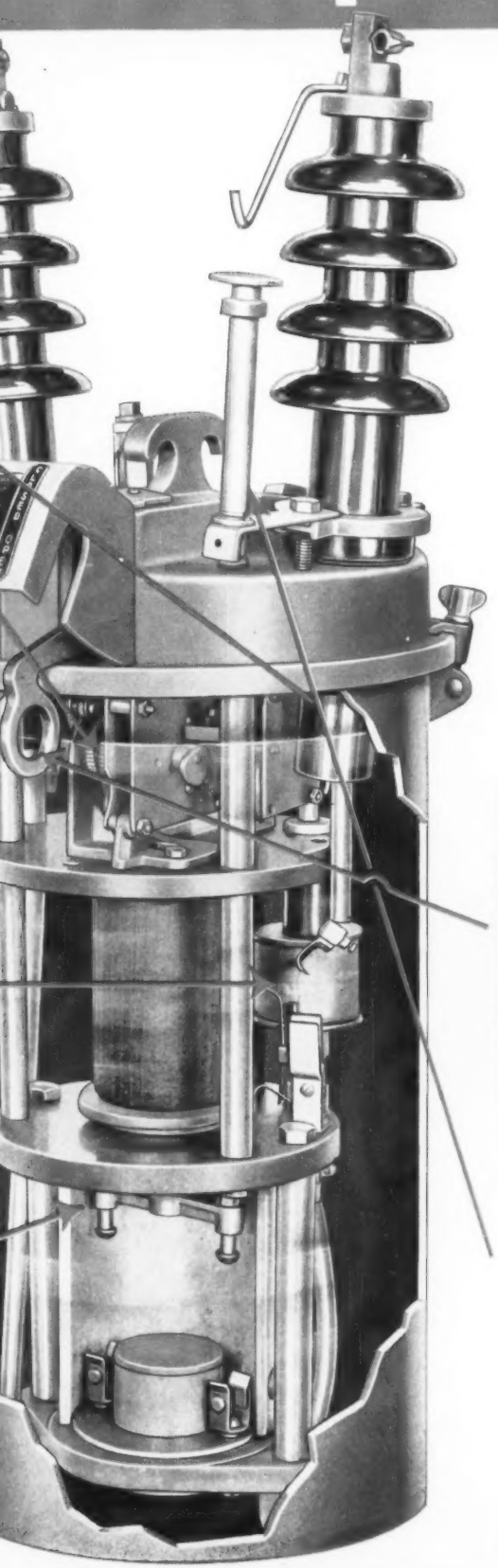
LOAD BREAK DEVICE. Point pressure, double-break contacts of special alloy arc-inhibiting material are used to interrupt fault currents. The interrupting chamber is fibre enclosed (of itself an arc deionizer) and submerged in transil oil. Two vent holes in the fibre are arranged so that the arc-breaking operation of the contacts produces a pumping action to force fresh oil between the contacts. In this way oil-carbonization is held to a minimum, the arcs are more quickly extinguished, and the life of the contacts prolonged.





Eliminates Unnecessary Fus

B with 5 Outstanding Operating Features

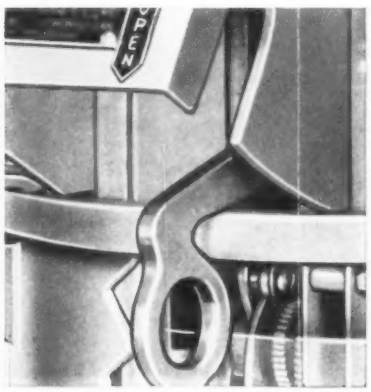


The Kearney OCB is a single pole, steel case, two bushing breaker, arranged for four operations before lockout. Any or all of the operations may be had with or without time delay. For instance two fast openings will usually afford sufficient protection for line equipment and the remaining two slow openings can be adapted to coordination between branch line fuses and the breaker.

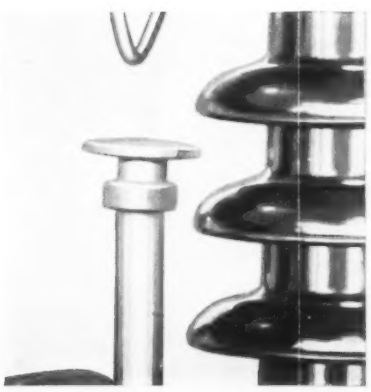
VOLTAGE AND AMPERAGE RATING. For use in series on single phase lines of 15,000 volts line to ground or lower . . . Trip-coils which govern the current carrying capacity are available in 5, 10, 15, 25 and 50 ampere ratings. The Trip-coil selected must correspond in rating to maximum continuous load current of the line. Example: For a line carrying a maximum of 10 amperes continuously a breaker having no smaller than a 10 ampere Trip-coil should be ordered.

The Trip-coil relays to open its contacts at double its rated load causing the breaker to operate. Example: A 10 ampere Trip-coil relays at 20 amperes. Therefore, the minimum fault current at point of installation of the breaker must not be less than 20 amperes.

The Trip-coil has a maximum interrupting capacity of from 24 to 30 times its current rating. Therefore, the value of the fault current at the point of installation of the breaker must not be in excess of this value. Example: A 10 ampere Trip-coil has a maximum interrupting capacity of 250 amperes. This size of coil should be used only where the maximum fault line current is less than 250 amperes.



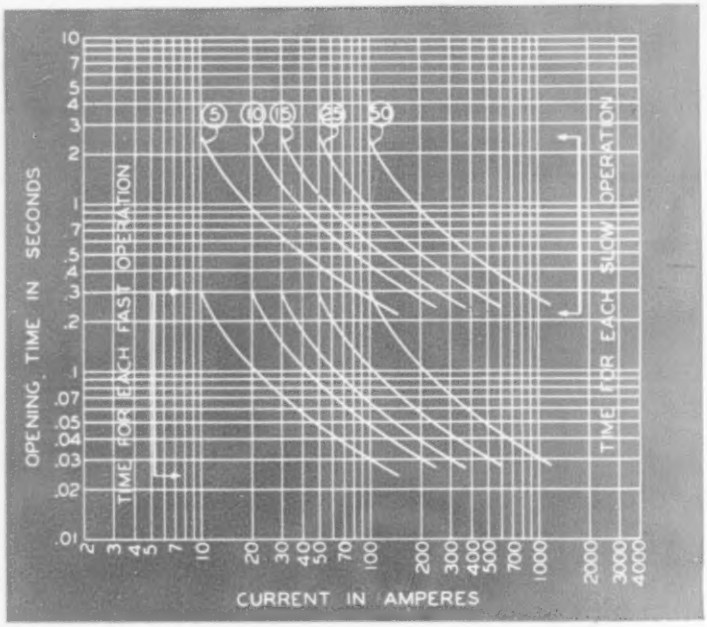
MANUAL TRIP PULL RING. A convenient Pull ring, insulated from all live parts is located within the hood on the cover of the OCB. Operation of the Pull ring is independent of the internal mechanism and moves only when the breaker locks out. The Pull ring mechanism is arranged so that the breaker cannot be held closed on a fault. For manual opening the Pull ring is pulled down with a switch stick whereupon the main contacts are spring actuated into the open position for safer and greater speed of operation. A counter located under the hood records the number of operations.



LIGHTNING ARRESTORS. Kearney OCB'S are fully protected from lightning by *two standard* Type PT arrestors mounted directly on the cover. These are the Kearney expulsion gap arrestors that have established notable records on rural lines throughout the country. As explained elsewhere separate protection is provided for the Trip-coil by means of an internal gap. Your OCB's represent a sizable part of the line investment and upon their proper operation the continuity of service depends. That is why the Kearney OCB comes to you completely equipped with full lightning protection.

Fuse Outages · Reduce Service Calls

ELECTRICAL and PHYSICAL DATA on the KEARNEY OIL CIRCUIT BREAKER



FAST AND SLOW CHARACTERISTICS OF THE O.C.B.

ELECTRICAL DATA

1. Minimum Trip-coil operating current is double the rating of the Trip-coil.
2. Open circuit time interval between each reclosure is 2.5 seconds.
3. Time required to automatically reset after one or more operations where lock-out does not occur is about 5 seconds.
4. For various Trip-coils the maximum interrupting capacity is:

5 ampere coil.....	150 amperes
10 ampere coil.....	250 amperes
15 ampere coil.....	375 amperes
25 ampere coil.....	600 amperes
50 ampere coil.....	1200 amperes

PHYSICAL DATA

Terminal Wire Size: No. 2 Stranded Copper.

Mounting: Supplied with either lugs for direct pole mounting or standard cross-arm hanger.

Shipping weight (with oil): 190 pounds.

Oil: Capacity 8 gallons. Flash point, 132° C. Fire point, 148° C. Viscosity (Soybolt SSU), 57 seconds at 40° C. Pour test, 40° C. Dielectric strength, 22 KV standard gap.

Oil level gauge . . . is supplied as standard equipment.

How to Order the O·C·B

Please read the information under Voltage and Amperage Rating on the center pages of this circular.

A. Then select the proper Trip-coil rating for your system from the table below.

B. Specify the number of fast and slow reclosures desired.

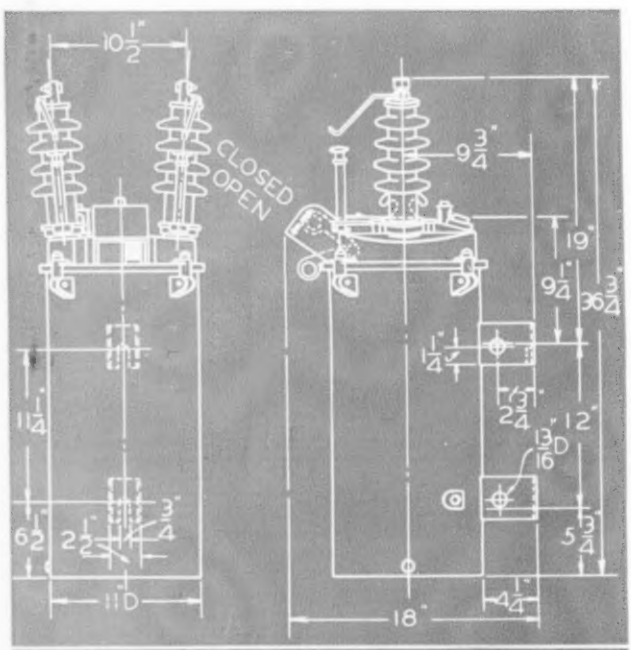
C. Choose between pole and cross-arm mounting. Then write your order like the following example:

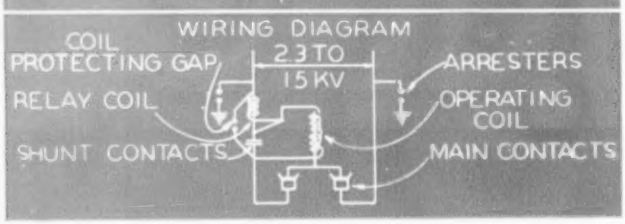
> 25 No. 12800-15 Kearney OCB's—15 amperes, set for 2 fast and 2 slow operations. Cross arm mounting

*Trip-coils and fast or slow settings cannot be changed in the field. We suggest removal of the unit to storeroom where such changes can be made conveniently. Write for these instructions.

CATALOG AND DIMENSIONAL DATA

Catalog No.	Trip-coil Amperage	Voltage Rating	Net Price
12800-5	5	15 KV or lower	$85.00 each complete with oil F.O.B. any domestic freight station
12800-10	10		
12800-15	15		
12800-25	25		
12800-50	50		





JAMES R. KEARNEY CORPORATION

Manufacturers and Designers of Overhead and Underground Utility Equipment

4224-42 CLAYTON AVENUE **SAINT LOUIS (10), MISSOURI**

PRINTED IN U. S. A.
5-5-10-44

Liquid Control (1223)

Photoswitch has a new control to check liquid mixtures electronically. It is for control of all applications in which changes in concentration are accompanied by a corresponding change in electrical conductivity.

For installation, a probe fitting is mounted on the tank, with probe extending into the liquid. This probe is wired to the electronic control, which may be located wherever desired. An adjustment on the control housing is set so that the control relay will operate when liquid of predetermined electrical resistance contacts the probe. While the probe is immersed in liquid of any other resistance, the control remains inoperative, but when a change in concentration alters the conductivity of the liquid to the necessary degree, the electronic control relay is energized to operate signals, valves or pumps.

Type P25N has a sensitivity range of 100 to 5,000 ohms and operates on a 5% change in probe-circuit resistance. The predetermined resistance value for which the control is set remains fixed regardless of variations in line voltage or tube characteristics. The voltage applied to the probe never exceeds 25 volts. The device incorporates a single-pole, double-throw relay, rated at 10 amp. a-c, 5 amp. d-c, for normally closed and normally open operation and requires a supply of 115 volts a-c, 60 cycles.

Timer (1224)

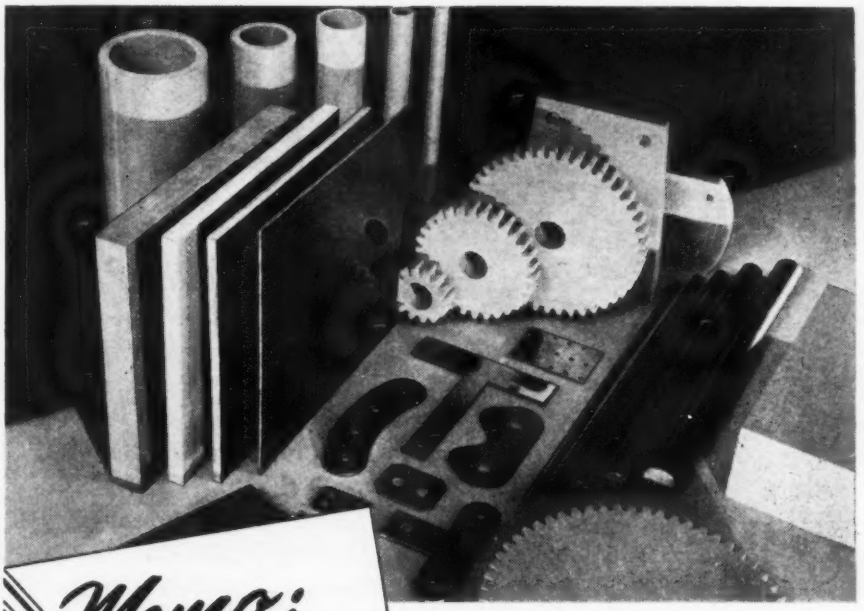
General Electric has announced a new weld and sequence timer for providing the various time and current adjustments necessary for welding heavy section of air-hardenable steels. Designed for use with the company's ignitron contactor and a heat control panel, it can be used in combination with most G-E spot welding controls, which include the phase-shift method of heat control, the announcement states. The timer operates from 230/460/575 volts, 60 cycles.

The control consists of nine time intervals, seven independent heat adjusters, two pressure interval timers, one squeeze timer, one hold timer, and provisions for a two-stage switch, all housed in steel enclosures. Control adjustments are accessible on the front of the panel and each timer has a separate time adjustment and an indicating light. The heat control potentiometers have large graduated dials which enable accurate heat settings. A minimum of tubes is used to give the multiplicity of operations required, according to the announcement.

Molding Compound (1225)

Plastics Department of E. I. du Pont de Nemours & Co. has developed a new molding compound of "Lucite," said to have heat-resistance 30° to 40° F. higher than general-purpose powders. Designed as HM-122, this new formulation is allocated to essential uses, such as colored caps for switchboard light signals, airfield landing light lenses, relay box covers, battery adapters, etc. The material is said to possess unusual clarity and brilliance and excellent reflecting properties, which are exceptionally free of distortion when molded properly. It can be secured in a range of transparent, translucent and opaque colors for use both indoors and outdoors.

According to the announcement, the material will have many postwar uses where transparent protective coverings operate under high temperatures.



Memo: to a Manufacturer Who has not yet Used

LAMICOID

When specifications call for a plastic laminate which will meet requirements ranging from battleship switchboard panels to finely fabricated parts...experienced buyers call for LAMICOID!

LAMICOID, a thermosetting plastic laminate in sheet, rod or tube form, may be sawed, sheared and punched, or machined into intricate parts of extremely close tolerance. It is moisture-resistant, lighter than most woods or metals, yet has a high degree of tensile and flexural strength which makes it superior to either material for countless applications. LAMICOID is resistant to corrosive chemicals and impervious to many of them. Since it is made with a wide selection of base materials—including asbestos paper, Fiberglas, linen canvas, and assorted papers—it is available in grades suited to either high or low voltage applications. It has excellent dielectric strength, showing low losses even in the presence of high humidities. In short, LAMICOID is an electrical manufacturing material of sufficient importance and versatility as to warrant your early investigation.

Triangle-Pacific Company, west coast representatives of Mica Insulator Company, stock LAMICOID in all standard grades, colors and sizes . . . and offer quick, convenient fabrication facilities for western industries. Their experienced counsel is at your disposal without obligation.

West Coast Sales Representatives

TRIANGLE-PACIFIC COMPANY

SAN FRANCISCO: 1045 Bryant Street LOS ANGELES: 340 Azusa Street

SEATTLE: 95 Connecticut Street

Mica Insulator Company

200 VARICK STREET · NEW YORK 14, N. Y.

ANOTHER PRODUCT OF GENERAL

NEW G-E SLIMLINE

OUT of General Electric's research laboratories now come four new fluorescent lamps—the G-E SLIMLINE—developed by the research organization that has originated so many other lighting firsts. ● These long, slim G-E Fluorescent Lamps—up to eight feet in length—will inspire a wealth of creative new lighting effects, especially in the commercial field, at a cost within the reach of an extensive lighting market. They will stimulate the trend to long slim lines of soft, diffused light . . . for general illumination, cove lighting and showcases. They will expand the opportunities for combining attractive new decorative effects with substantially higher levels of illumination. ● Production of G-E SLIMLINE Mazda Fluorescent Lamps will proceed as fast as conditions permit. We will inform you as soon as they are available.

ELECTRIC LAMP RESEARCH

FLUORESCENT LAMPS!

G-E SLIMLINE Mazda Fluorescent Lamps offer advantages never before combined in any fluorescent lamp:

(1) slim lines of light for new effects

(2) higher efficiency—average of 60 lumens per watt

(3) instant starting, without starters

(4) long life

(5) operation singly, in multiple or in series

(6) single pin base—makes possible a safe design of lamp and socket for multiple or series operation

(7) operation over a range of wattages and current values—100 to 200 milliamperes.

GENERAL ELECTRIC SLIMLINE MAZDA FLUORESCENT LAMPS

Lamp		Current (Milliamperes)	Lumens (Approx.)
42T6	Nominal Length *42″ Outside Bulb Diameter ¾″	100	900
		200	1400
64T6	Nominal Length *64″ Outside Bulb Diameter ¾″	100	1400
		200	2150
72T8	Nominal Length *72″ Outside Bulb Diameter 1″	100	1400
		200	2350
96T8	Nominal Length *96″ Outside Bulb Diameter 1″	100	1950
		200	3300

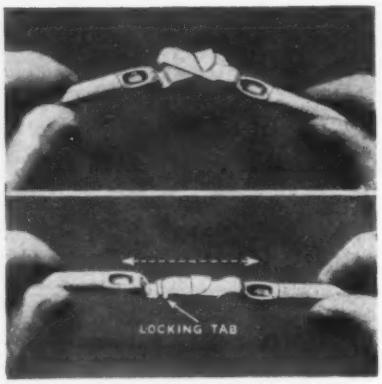
Standard 40-watt F lamp, shown for comparison

*Nominal length includes one lamp plus two multiple sockets. When series sockets are available, the increase in overall length will be announced.

GENERAL ELECTRIC

2,000,000
New Customers
WAITING FOR
SERVICE
● A recent survey indicated that 2,000,000 rural homes not wired could use electricity to advantage. Of these, 400,000 are near existing lines and 1,600,000 will have to be served by new lines.
The building industry is talking in terms of 1,000,000 new homes a year for the first five years after the war. This means a vast increase in line load in urban communities.
This construction indicates a huge backlog of demand for telephone service.
Discount these figures as you will—the fact remains that public utility companies face a big program of line construction after the war.
Klein tools and equipment will be ready for the linemen and electricians working on this expansion program. The Klein line of tomorrow will continue to offer the same high quality—the same regard for safety that has characterized all equipment carrying the name Klein "since 1857."
ASK YOUR SUPPLIER
Foreign Distributor:
International Standard Electric Corporation, New York
This book on the care and safe use of tools will be sent without charge upon request.
LONG LIVE TO TOOLS
KLEIN
Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.
3266 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Connector (1226)



Burndy Engineering Co. is making an electrical connector, with a special locking feature, claimed to prevent loosening or pulling-apart in service. Called the Burndy Clasp, the device was designed for small wires and, according to the announcement, has been approved by the U. S. Army Air Forces.

It is composed of two identical halves and slides together in jack-knife fashion, locking in positive position with a slight pull. The connection is opened by pushing the halves together and giving them a slight swing.

Although engineered to meet wartime aircraft requirements, this connector is believed to have postwar applications in other fields. It is made now to accommodate 10 sizes of aircraft cable.

Photometer (1227)

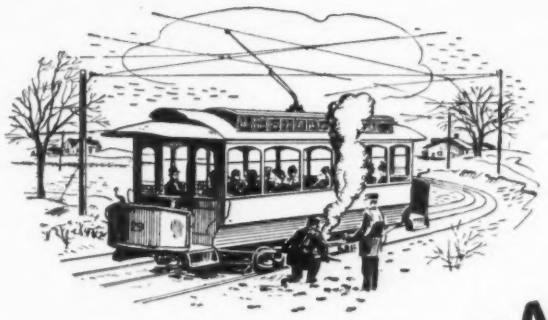
A transmission photometer for measuring the amount of light transmitted through very small areas of spectographic plates has been announced by General Electric Co. It is for use in spectographic analysis, such as in the metal fields, and for microcolorimetric and microchemical analyses and for measuring light transmission through solutions.

Controls (1228)

Brown Instrument Co. has added to its line electronic contact controls for circular chart electronic potentiometers. These controllers will be available in two forms. One will contain a locking-in type relay, designed primarily for electric furnace control; the other, without a relay, is for direct control of motorized valves, operation of signalling devices and for applications requiring a "dead" neutral.

Aircraft Breaker (1229)

Square D is making a new push-pull aircraft circuit breaker, Class 9311 Type A. This device, according to the company, provides both switching and protection similar to toggle type breakers and also guards against accidental or careless operation of vital circuits. A definite pull action is required to open the breaker manually. The manual reset button is provided with a red hand to indicate trip in daylight and a luminescent band to indicate trip in darkness. A bi-metallic trip element gives time limit protection against small momentary overloads, as well as instantaneous protection on heavy overloads and short circuits. Available in sizes 5 to 50 amp.



Electric street cars of the 1880's used copper brushes... brushes that sparked, melted, cut grooves in commutators and ruined armatures. Engineers were baffled. The future of electric traction looked black. Then someone thought of the *carbon* brush!

THEY GAVE AMERICA THE CLEAR-TRACK SIGNAL!

That brilliant experiment with carbon, plus years of research by National Carbon Company, Inc., made possible the modern brush of high performance . . . typified in the Pennsylvania's crack "Congressional Limited" which averages 172 round trips from New York to Washington, D. C., on a single set of brushes.

CARBON BRUSHES made the halting electric street cars of the 1880's a success . . . giving the clear-track signal—the railroader's "green board"—for development of the magnificent electric locomotives of today!

Today, as for decades, "National" brushes serve most of the Nation's electric railroad and traction systems . . . typical of the enduring leadership they have earned *in every field.*

For wherever utmost dependability and efficiency are sought, "National" brushes are preferred. They're giving the "green board" to generators, motors, converters, and other types of rotating electrical equipment used by power companies, mines, mills, factories, chemical plants, transportation and communications systems, farms, homes, and most of the machines of war.

"National" brushes—carbon, graphite, electro-graphitic, and metal-graphite—are made in a series of standard grades and sizes. Our engineering knowledge, experience and research are available to assist in the selection of the proper brushes for any type of application. If you have not received copies of "Modern Pyramids"—an informative booklet on brush operation and care—write National Carbon Company, Inc., 30 East 42nd Street, New York 17, N. Y., Dept. 17L.

The word "National" is a registered trade-mark of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

General Offices: 30 East 42nd Street, New York 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

KEEP YOUR EYE ON THE INFANTRY... THE DOUGHBOY DOES IT!

WHEN YOU CHECK UP ON YOUR PLANT'S PAY-ROLL SAVINGS PLAN FIGURES!

These days, things change with astonishing speed. The Pay-Roll Savings Plan set-up that appeared to be an outstanding job a short time ago, may be less than satisfactory today.

How about checking up on the situation in *your* plant? Checking up to see if everybody is playing his, or her, part to the full measure of his, or her, ability. Checking up to see if 'multiple-salary-families' are setting correspondingly multiple-savings records.

A number of other groups may need attention. For example, workers who have come in since your plant's last concerted bond effort. Or, those who have been advanced in position and pay, but who may not have advanced their bond buying accordingly. Or even those few who have never taken part in the plan at all. A little planned selling may step contributions up materially.

But your job isn't finished, even when you've jacked participation in your Pay-Roll Savings Plan up to the very top. You've still got a job before you—and a big one! It's the task of educating your workers to the necessity of not only buying bonds, but of *holding* them. Of teaching your people that a bond sold before full maturity is a bond robbed of its chance to return its full value to its owner—or to his country!

So won't you start *checking* . . . and *teaching* . . . today?

War Bonds To Have And To Hold!

LET'S ALL BACK THE ATTACK WITH WAR BONDS!

*The Treasury Department acknowledges with appreciation the publication of this message by

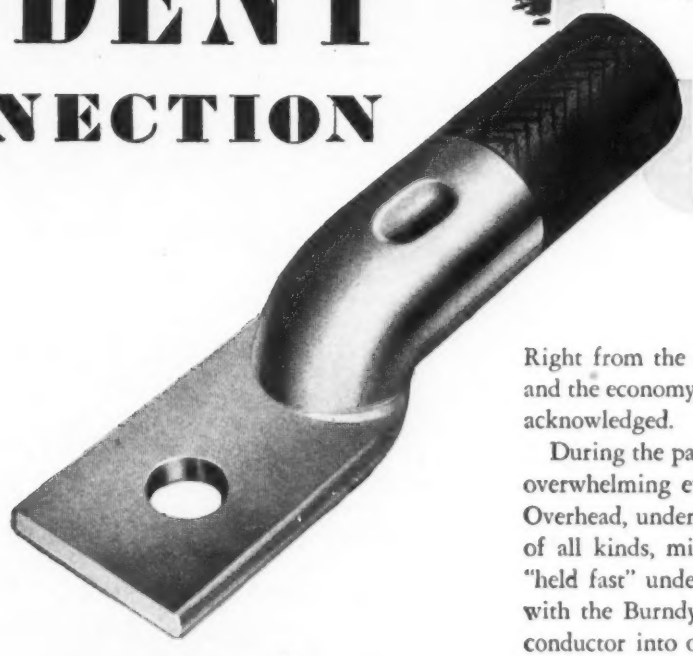
ELECTRICAL WEST

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

TIME-TESTED FOR

1937
1938
Permanency
1942
1943
1944

THE Burndy HYDENT CONNECTION



Right from the start . . . the simplicity, the efficiency, and the economy, of the HYDENT connection has been acknowledged.

During the past 8 years, too, there has been furnished overwhelming evidence of its unequalled *permanency.* Overhead, underground, and in circuits and equipment of all kinds, millions of HYDENT connections have "held fast" under all service conditions. For indenting with the Burndy HYTOOL compresses connector and conductor into one *integral* unit . . . *a connection that is truly permanent.*

With its permanency thus proved in actual operation, isn't it now time to take advantage of the big economies which HYDENT connectors provide? Available as HY-LUGS, HYLINKS, HYTEES, HYCRABS and others. Write for complete information . . . Burndy Engineering Co., 107 Bruckner Boulevard, New York 54, N. Y.

IN CANADA: Canadian Line Materials, Limited, Toronto 13

Headquarters for CONNECTORS

Burndy

Make all taps "hot" with TIPS clamps and clamp sticks

Tap on to steel, copper or aluminum conductors while lines are still energized. Tips Tap Clamps make a tight, positive contact that will not jar loose, but does not stick and can be removed "hot" with a Clamp Stick. Write for details of types and sizes.

Complete equipment for making hot tap connections should include the Grip-All clamp stick—available with either set of jaws as shown above. The hand grip will open and close the jaws to contact the clamp, close on the eye screw and pull the clamp into the head to make a rigid unit for applying the clamp to the conductor. Write for detailed information.

A·B·CHANCE CO. INDUSTRIES CENTRALIA MISSOURI

BULLETINS

data books, etc.

Air Conditioning (1230)

Looking toward postwar installations, Westinghouse Electric Elevator Co. has published an air conditioning booklet telling how the equipment works and outlining factors to be considered in planning for a specific application. Three general types of air conditioning are shown in installation photographs.

Measuring Devices (1231)

In a general catalogue issue of its house organ, "Modern Precision", Leeds & Northrup describes its measuring instruments, telemeters and controls for regulating power plant processes. Equipment is grouped according to application. Illustrated.

Tire Maintenance (1232)

Data on its commercial tires is given in a 96-page pocket-sized handbook recently issued by the B. F. Goodrich Co. One section is devoted to factors affecting tire life, and another to instructions for mounting and other information about synthetic tubes.

Arc Welding (1233)

Arc welding procedures for cast iron are discussed in a 12-page booklet prepared by C. E. Phillips & Co. Four types of electrodes for use on cast iron are described and the characteristics and best welding procedures for each are explained.

Catalogue (1234)

Wheelco Instruments Co. is offering an enlarged edition of its thermocouple data book and catalogue. Descriptive material, prices, tables are included.

Data Sheet (1235)

Frank Adams Electric Co. has issued a new data sheet on its wire and cable distribution systems for light and power.

Resistance Welding (1236)

"Resistance Welding at Work" is the title of a 60-page bulletin published by the Progressive Welder Co. Applications are described and illustrated.

Storage Battery (1237)

B. F. Goodrich Co. has prepared a catalogue section covering its rechargeable wet storage battery for flashlights.

Clamps, Fittings (1238)

Punch-Lok Co. has issued bulletins describing its method of banding and splicing and its line of clamps and fittings.

Devices (1239)

Frank Adams hanger outlets and floor boxes are described and illustrated in a new eight-page bulletin issued by the company.

Welder Controls (1240)

A booklet dealing with seam-welder controls for resistance welding machines has been published by General Electric.

Masts, Towers (1241)

Harco Steel Construction Co. has prepared a booklet on its line of masts and towers. Illustrated.

Rural Transformers (1242)

Rural transformers are the subject of an eight-page bulletin issued by the Standard Transformer Co.

Foundry Ovens (1243)

Despatch Oven Co. has issued a data sheet on its line of Coremaster drawer type foundry ovens.

Reflectors (1244)

Holophane has issued a data sheet on its "one-point-five low-bay reflectors.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

Please send me information about following CIRCLED items:

1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210
1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221
1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232
1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243
1244

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Why Jim Broke His Leg!

Postwar lighting will keep thousands of "Jims" from accidents caused by inadequately lighted floors and machinery. Jim won't trip over an obstruction that's properly illuminated — and color coded to catch his eye.

Skillful combination of incandescent, mercury vapor and fluorescent lighting—plus color code safety painting—will do much to reduce industrial accidents — and increase manhour output.

In readying your plant for stiff, peacetime operation, be sure to consider Better Lighting.

THERE'S A MAN on your staff who draws *no* salary—yet is always willing to consult with you. He's your local power company's lighting engineer. He likes to work in his shirtsleeves—getting down to cases as to exactly *what* types of lighting . . . placed *where* . . . will do the *most effective* lighting jobs in your plant.

He's concentrated on this problem for many years—has most of the answers at his finger tips. Why not tap his knowledge *now?*

And when the time comes to install better, safer lighting, air conditioning, improved power distribution methods, the electric and electronic cost-cutters evolved during the war . . . remember Roebling as wire specialists—your logical, single source of all the wires and cables required in your modernization program.

FASTEST SOURCE OF BETTER LIGHTING FACTS IS YOUR LOCAL POWER COMPANY

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

San Francisco · Los Angeles · Seattle · Portland

JR ROEBLING

ROEBLING

PACEMAKER IN WIRE PRODUCTS

Wire Rope and Strand · Fittings · Slings · Aerial Wire Rope Systems · Cold Rolled Strip · High and Low Carbon Acid and Basic Open Hearth Steels · Round and Shaped Wire · Electrical Wires and Cables · Wire Cloth and Netting Aircord, Swaged Terminals and Assemblies · Suspension Bridges and Cables

THIS ADVERTISEMENT is appearing in current issues of *Mill & Factory* and *Purchasing*, carrying the Electronic Utilization message to 39,569 industrial executives. When industrial load building becomes a problem again, we hope these 1944 Roebling messages will have helped to pave the way for your efforts.

REPRINTS of the advertisement available on request

ELECTRA'S HUSBAND

Genii of the Bottle

"SAY, here's just the thing for your room in that new house you talk about building," Electra said one evening recently as she sat thumbing through the election issue of *Time*. "You say that the house ought to have all of the built-in comforts available. This ad has some good ones."

"What do you mean *my* room?" I quipped. "All I want is a closet in which I can put my fishing stuff, sleeping bag, golf clubs and the rest of my junk where you won't constantly say 'what smells around here?'"

"Well, how about the time I found a can of dead angle worms in your fish basket?" Electra countered. "They certainly smelled."

"Don't ever say that," I said. "Remember I'm supposed to be a fly fisherman. But what about the ad?"

"It shows a picture of a modernistic bedroom," Electra recited. "Alongside the bed there is a little dingus with a lot of switches and colored lights. 'Tomorrow's automatic sleep comfort' the caption reads. It says. 'Twist the dials and one control panel will do all this: (1) Regulate window to admit filtered cool air at night . . . automatically close it when you awake . . .'"

"Nuts," I interrupted.

"But listen to the rest," she said. "'Turn on pinpoint bed light and direct the rays to wherever you want them.'"

"More hokum," I cut in again.

"You're too critical," she said and then read on, "'slide closet door out of wall and swing out clothes for your selection . . .'"

"Pure bunk," I said.

"The next thing doesn't make any difference to you, but I like it," Electra continued. "Listen to this: 'raise mattress for ease in making bed.'"

"Who ever heard of such foolishness?" I said. "Let me look at that ad." And I reached over and took the magazine from her hand. The picture was there all right. So was the caption that she had read. The nature of the advertiser was the thing that shocked me. The headline read, "Men Who Plan Beyond Tomorrow Prefer the World's Lightest Highball!" The signature was that of one of the popular brands of whiskey.

"This explains the whole thing," I told Electra. "The guy who wrote that advertising copy was sampling his own stuff. The more he sampled the wilder his claims. As a matter of fact a lot of the postwar dreamers in the appliance business must have been drinking this same brand."

"But the chap who wrote this stopped before he got to the pink elephants," Electra commented.

PATIENCE is a virtue of peoples other than the Chinese. Take the little business man in America for instance. I was telling Electra about the case of a man who operates the appliance service business in one of our smaller Western communities. He keeps the washing machines running, the refrigerators working, the furnaces hot, the radios playing and a host of other highly essential services intact. He has a helper and the two of them are busy all hours of the day and night and the people in this community are thankful.

One of the things to which he paid little attention was the quantity of government forms that were addressed to him. He was too busy working. Now it appears that one of the things he overlooked was some information regarding his social security taxes. Not that he had overlooked paying; it was simply that his reports had in them some slight irregularities. One day a man came around and told him that he had been penalized $10 because of his oversight. Realizing that the cost in time and money might far exceed this amount if he decided to fight the penalty, he paid the fine.

So the service man and his assistant went on working busily. Then one day another government investigator came around. This time something else was wrong. Maybe there would be another penalty and fine. Certainly there would be time consumed fighting and arguing. Right then patience ended.

"See here," the service man said. "Just the minute you put another penalty against me, that's when I lock the door and throw the key to this place away. I can make more money with a lot less work on some war project."

After taking a good look at 180 pounds of fighting-mad American, the government man turned on his heel and walked off. There was no penalty.

"Maybe the rest of us haven't got mad enough," was the way Electra summed it up.

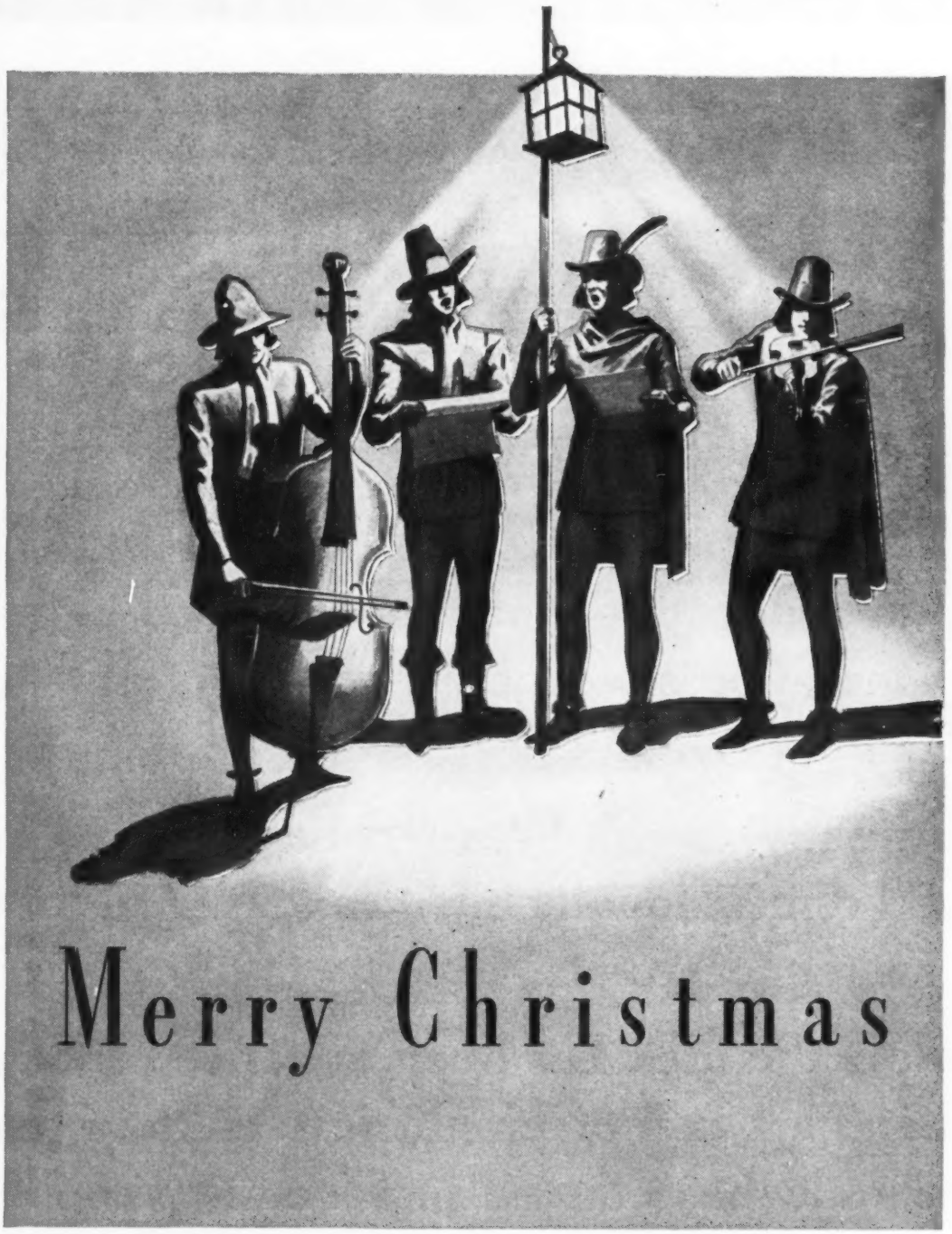
BACK in the days of the New York and San Francisco World Fairs there were dropped into the depths of the earth "time capsules"—huge sealed steel cylinders — containing quantities of current information and current products. One of our readers has sent us a copy of a letter that was recorded on microfilm and enclosed in the capsule. He thinks that its contents bear philosophical study today instead of 4,994 years from now. The letter is Dr. Einstein's *Impression of the Modern Age*. Here is what it says for posterity to read:

"Our time is rich in inventive minds, the inventions of which could facilitate our lives considerably. We are crossing the seas by power and utilize power also in order to relieve humanity from all tiring muscular work. We have learned to fly and we are able to send messages and news without any difficulty over the entire world through electric waves.

"However, the production and distribution of commodities is entirely unorganized, so that everybody must live in fear of being eliminated from the economic cycle, in this way suffering from the want of everything. Furthermore, people living in different countries kill each other at irregular time intervals, so that also for this reason any one who thinks about the future must live in fear and terror. This is due to the fact that the intelligence and character of the masses are incomparably lower than the intelligence and character of the few who produce something valuable for the community.

"I trust that posterity will read these statements with a feeling of proud and justified superiority."

Posterity won't so read them at the rate the human race is going right now. But humanity being what it is, it can be counted on to feel superior about this age even if it has made no appreciable improvement over it ethically. Most of our progress seems to be made mechanically, not morally, and the breakdown of the latter takes the former with it, and so *ad infinitum*.



SPANG-CHALFANT

Division of The National Supply Company

Executive Offices: Grant Building, Pittsburgh, Pa.

District Offices and Sales Representatives
in Principal Cities

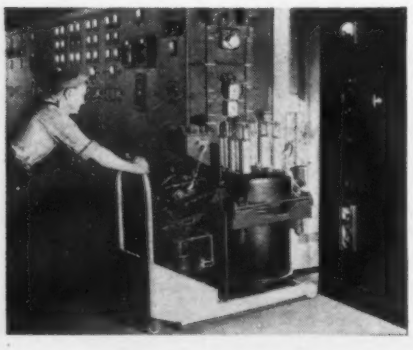
STANDARDIZATION —by Evolution?

☛ Today everyone agrees that standardization of electrical apparatus—when practicable — benefits all concerned.

☛ It is clear that the standardized metalclad unit—introduced to America by Allis-Chalmers —has made possible a better product at a lower price.

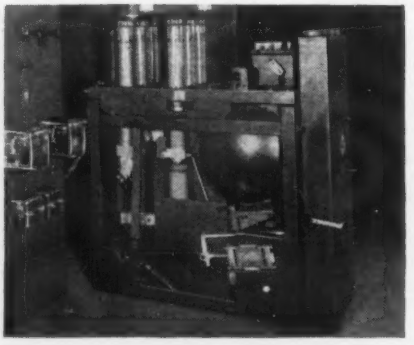
☛ Already, circuit breakers have been standardized dimensionally to fit in standard metalclad switchgear units.

☛ Now the idea has been advanced that the number of types of circuit interrupters available should be reduced in favor of simplified



1

THE OIL CIRCUIT BREAKER, as offered by Allis-Chalmers, is the product of development and research over 40 years. It has high impulse strength, simple mechanical construction, and is "Ruptor"-equipped for lower maintenance operation.



2

AIR BLAST BREAKER, first commercially introduced in this country by Allis-Chalmers six years ago, gives unexcelled all-around performance. Arcing time is within one-half cycle. It is ideally suited for repetitive high current interruption.

OF SWITCHGEAR . . —or Revolution?

manufacture. Should it be? If so, by whom?

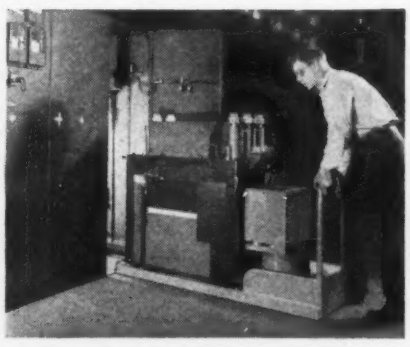
☛ Allis-Chalmers believes generally in the EVOLUTION of electrical apparatus — in which the buyer, with his intimate knowledge of his local problems, is the "agent of natural selection." By this process, the fittest types of equipment are almost certain to survive . . . far more so than if selection depended solely on the judgement of manufacturers.

☛ Thus Allis-Chalmers offers—without price penalty — not one, but *three* types of circuit breakers . . . so that logical evolution of switchgear may take place through buyer choice.

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

A-C

A 1806



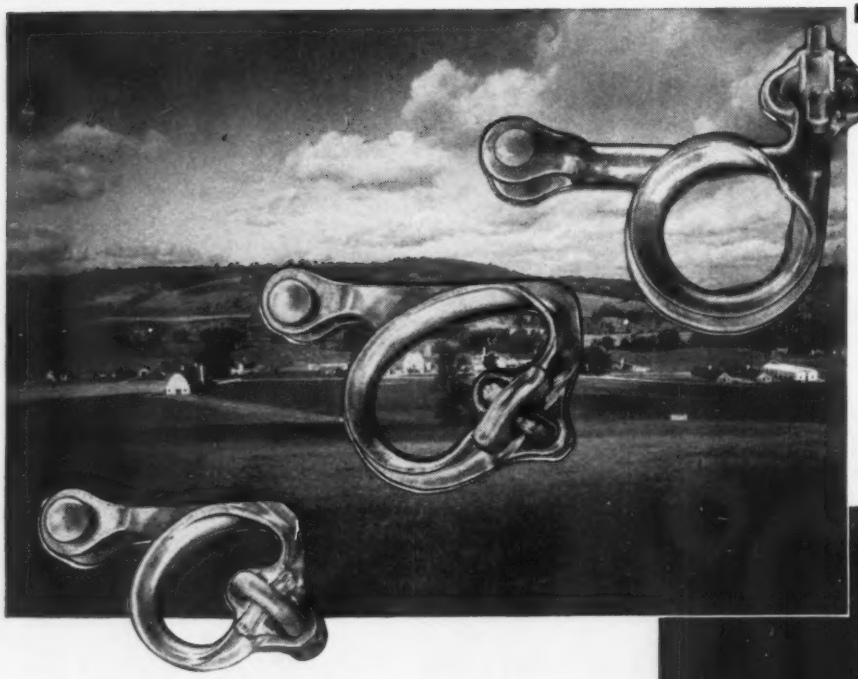
3

THE MAGNETIC AIR BREAKER is popular among operators for moderate capacity installations, in 5 kv voltage and below. Fire hazard is reduced and handling of oil is eliminated in Allis-Chalmers' reliable "Ruptair" magnetic air breaker.

ALLIS-CHALMERS

MILWAUKEE 1, WIS.

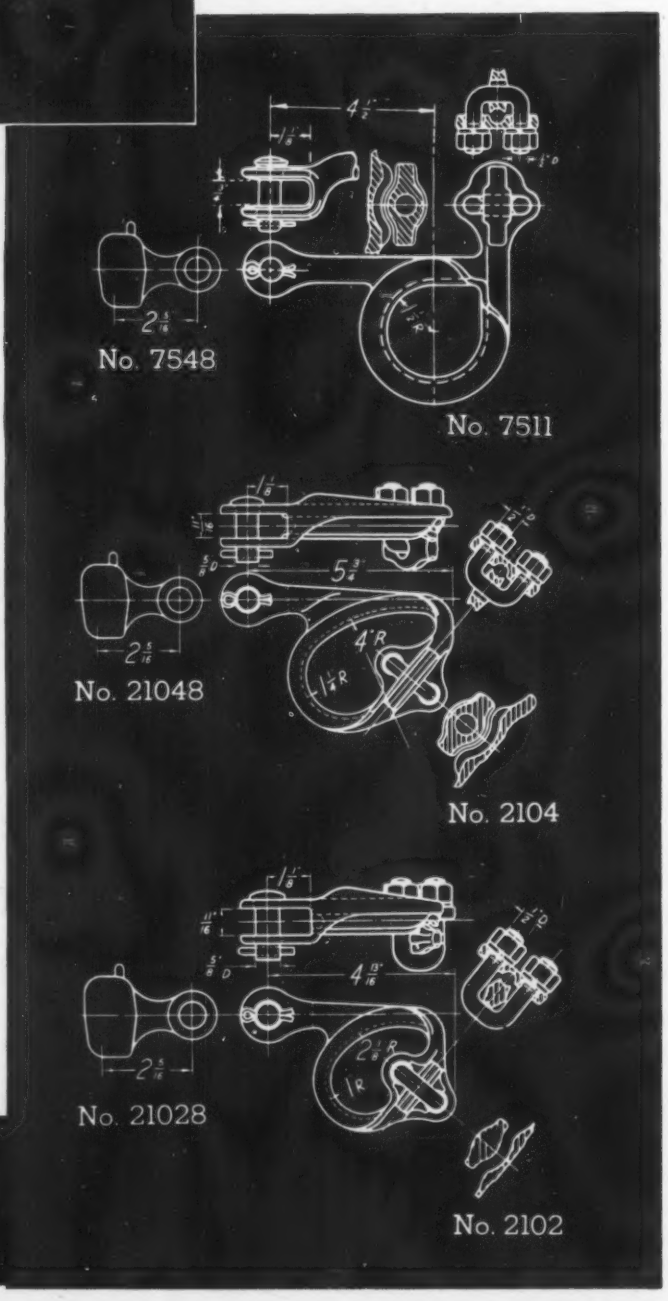
For Rural & Light Transmission Lines



These are the familiar and accepted snubbing type, designed for dead-ending the lighter duty transmission and distribution lines. Low in price, they are especially adapted to rural electrification and light transmission work.

The use of forged steel parts results in a light-weight clamp with more than adequate strength. This feature, together with the short connection length, protect the conductor from the possible effect of vibration.

The ample radius of snub, smooth cable seat and long clamping keeper prevent damage to the conductor and the side opening type is easy to install and work with hot-line tools. Reversible two-groove keepers accommodate a wide range of conductor sizes.



No. 7511 (without fitting). No. 7548 (with socket eye).
For all conductors within its size range.
Min. 0.16—Max. 0.55.

Not recommended for A. C. S. R. conductors larger than No. 2-0 due to their stiffness.

Ultimate strength 10,000 lbs. Shpg. wgt. 280 lbs. per C.

No. 2104 (without fitting). No. 21048 (with socket eye).
For all conductors within its size range.
Min. 0.187—Max. 0.50.

Ultimate strength 9,000 lbs. Shpg. wgt. 200 lbs. per C.

No. 2102 (without fitting). No. 21028 (with socket).
For all conductors except A. C. S. R. within its size range.
Min. 0.128—Max. 0.375.

Ideal for the popular A series Copperweld-copper or other similar three-strand composite conductors.

Ultimate strength 7000 lbs. Shpg. wgt. 145 lbs. per C.

BTC

Through Your Insulator Manufacturer Only

Drop Forged Hi-Line Hardware

THE BREWER-TITCHENER CORPORATION
CORTLAND, N. Y.

ELECTRICAL WEST

DECEMBER, 1944
VOL. 93 NO. 6

POSTWAR COMPETITIVE POWER

*J. P. McElroy**
Pacific Gas and Electric Co., Fresno

ONE of the main functions of a utility sales department is to hold its existing business, as well as to secure new business. The load-holding program in many cases is much more important than the securing of new business. Obviously this is true because of the capital invested in serving the existing business, and if that load is lost this investment becomes idle. Hence the importance of competition.

Both industry and agriculture in its transition to peacetime production will need assistance with market analysis and development. Competition will be ready to furnish this help. The power salesman must take an interest in these problems also. What we knew and what we did for our customers in the years before the war will not be enough in the years following victory. Power salesmen must spend more time with the customer and on the sales end of the job, and less time in office work and engineering detail. Customers, of course, will not get less engineering service, because this service should and probably will be rendered by specialized engineers.

The logical way to meet competition is to render a superior service. This requires an intimate knowledge of the customer's use of electricity and operating methods in order to determine whether or not proper utilization is being made of electric service. More than that, it often requires that technical assistance be given to determine wherein the customer's operating methods may be improved.

An intimate study of the customer's needs and methods of operation often discloses that a proposed plant, whether it be electric or some other competitive energy, will not be suited to his purpose, even though it may appear to be of adequate capacity and economically feasible. An investigation of this nature in the case of an existing plant will sometimes result in proving it is not operating as economically as the owner may believe.

All of the above determinations might properly be delegated to the utility sales force. In the last analysis, it is they who are charged with the retention of existing load and customer good will, as well as the acquisition of new business. However, it is almost impossible for them to do this and still do justice to their job of selling and handling the routine business involving the company and the customer. Also, unfortunately, too few utility salesmen are technically equipped to handle competitive problems.

It has been the experience of some power companies that this situation can best be met by delegating the major competitive problems to engineers in the sales department who are organized for that particular purpose. Such an organization requires the closest cooperation between the engineers and the power salesmen. It will not do for an engineer to gather a mass of technical information by way of solving a certain problem and then simply forward it to the salesman or to the customer as just another job completed. It requires, instead, a complete understanding of the nature of the problem by the power salesman and an equal understanding of the customer's entire problem on the part of the engineer. He must then proceed to solve that problem promptly and thoroughly.

Unfortunately, however, some engineers submerge themselves in the technical aspects of the problem, thereby losing sight of the fact that the technical solution is only the means to an end. Good business judgment and horse sense play a very important part in the solving of utility customer problems, and this must be constantly kept in mind. Best results have been obtained by the utility engineers having an intimate knowledge of the customer's method of operation; also by advising the customer how to obtain the greatest efficiency from his equipment through proper utilization of electric energy.

Some investigations of existing customers' electric utilization are without results, while others show mediocre possibilities. However, most investigations indicate some possibilities of reducing operating costs. All studies involving the customer's operations must be for the mutual advantage of both the customer and the utility. Negative results will mean no change in status or expense to the customer. The utility, on the other hand, will at least know where it stands and can better evaluate the cost and degree of future sales effort. A reduction in the customer's over-all operating costs may well result from such an investigation and the utility may gain additional load.

The probable trends of availability, production, and prices of competitive fuels will influence the direction of postwar competition.

The two basic problems in any consideration of the fuel situation are supply and price. The rate of discovery of new oil fields during the last few years has declined; the addition to reserves is mainly the result of revisions of previous estimates and extensions to existing fields. This decline in new discoveries may be attributed to limitations on the use of material needed for production, manpower shortage, and government price regulation. No doubt the rate of discovery will accelerate again after restrictions have been removed.

* Based upon an address before the Fall Conclave, Pacific Coast Electrical Association, San Francisco.

Wartime changes made by the oil industry in its equipment will have a considerable effect on the postwar supply of motor gasoline, household heating oil, diesel oil and residual fuel oil. Prices of crude petroleum have followed very closely the price trend of all commodities. Price trends of diesel fuel oil are different. In 1942 diesel fuel oil took a considerable rise in price, but immediately became stabilized at a level which is, however, 70% above the lows reached in 1933-36.

It is safe to say that, as far as the immediate postwar situation is concerned, there does not seem to be any basis on which to predict a postwar lack of available petroleum supplies.

In general, the discovery of natural gas has been parallel to that of oil. The future supply of natural gas appears to be assured for some time to come. The main problem, insofar as natural gas is concerned, is one of transportation. Postwar developments in distribution pipe lines from fields where gas is plentiful will make natural gas available to all points in the United States where it can be most economically used.

The marketed production of liquefied petroleum gas shows an uninterrupted rapid growth unaffected by the war. Domestic consumption represents more than half of the total distribution. Liquefied petroleum gas is derived from natural oil well gas or oil refining. Its availability in the immediate postwar period can thus be assured. Distribution now accounts for a large part of the cost of liquefied petroleum gas. Reduction in price could result from lower handling charges. In the year 1927 users of liquefied petroleum gas in the United States were estimated at 20,000; in 1937 at 400,000; in 1940 at 800,000; and in 1941 at 1¼ million. The potential liquefied petroleum gas market has been estimated at ten million users.

Liquefied petroleum gas today is a substantial competitor of the electric utilities for the consumer dollar. The best indication of consumer acceptance is volume of sales. In 1943 in the Pacific Coast area, sales of 137 million gal. were reported. This is about 20% of the total sales in the United States. Factors expected by the industry to affect increased postwar sales will be: (1) improvement in design of appliances; (2) safety devices; and (3) reduction in distribution costs.

Past experience has proved that the installation of a large storage tank on the farm for tractor and truck use offered a convenient means of utilizing butane for complete domestic use, for piping to the dairy barn for sterilizer use, and to the poultry house for incubation and brooder use. One delivery or dump into the central storage tank is made by the distributor at agricultural prices for the entire farm use. It is the opinion of many that electric utilities are handicapped in meeting this type of competition by not having some comparable all farm rate.

During the past few years and undoubtedly for the duration of the war, there will be a continued slackening of diesel engine competition for utility consumer loads. A recent survey conducted on the Pacific Coast shows that very few wartime engine installations have been made.

Because of this, the utilities are in an excellent competitive position for the remainder of the war. Advantage should be taken of this opportunity to prepare firmly for what is likely to follow at the close of the war. Postwar diesel engine competition for utility loads will be greatly intensified and may reach unprecedented levels. In 1943 diesel engine manufacturers produced an estimated 25 million hp. of new engines. This is about twelve times the output of 1939 and about 500% of the 1941 production. Of course, the war has created this tremendous increase. Nearly 100% of all diesels are now going to the Navy, Army, Maritime Commission, or lend-lease. Contracts terminate when peace comes. Engine manufacturers believe contract cancellations need not bring catastrophe. They feel they can hold their industry sales at one-half of today's line, or three times prewar. Their problem will be to find new customers for existing products without delay.

Manufacturers of competitive engines, tooled for mass production during the war, will be forced to seek peacetime outlets for their products. Loads served by the utilities offer a large potential market, and will, postwar, become a target for the diesel engine vendors. Decreased business, and consequently decreased profits in postwar, may cause electric customers to seek ways to save money and cut costs. At this time they will be fair prey for vendors of competitive engines.

The whole diesel engine picture may be summarized as follows:

Production capacity has rapidly expanded and several new manufacturers have entered the field. There have been few radical changes in design, but many improvements tending toward lower weight per horsepower, compactness, and simplicity. The industrial field is not emphasized as a major market. Attention seems to be centered on smaller units, mobile, marine, and transportation equipment. Engine prices will be lower, one manufacturer even going so far as to predict a reduction of from one-third to one-half of former prices. Diesel manufacturers do not fear serious competition from surplus engines produced for the war effort. There will be an adequate supply of diesel fuel with a possibility of a slight increase in price. There is already evidence of highly organized sales promotion campaigns far surpassing any previously encountered.

The gas engine situation sums up thus: There has been, during the last three or four years, considerable development in the gas engine field such as lighter weight per horsepower, more reliable units, etc. It is not believed that changes of this kind will materially alter the competitive situation as far as purchased utility service is concerned. There are developments, however, which may more seriously affect the competitive situation. These consist of, primarily, three things: (1) more manufacturers are developing small engines for small loads in the commercial and small power fields; (2) practically all manufacturers are developing the "package unit"; and (3) most manufacturers have developed engines which are interchangeable insofar as fuel is concerned. These engines will operate with minor mechanical changes on natural gas, manufactured gas, gasoline, or fuel oil.

Insofar as the original cost of engines is concerned, all indications point to only slightly lower prices per kilowatt or horsepower of capacity installed. It is not believed this slight reduction in price will be a major factor in competition, but will leave the situation only slightly different from prewar conditions. It is, therefore, believed that the major competitive effect will come from the development of "package units" and the interchangeability of fuels which may develop some new threats for purchased utility services. It is not, however, believed that this competition will be any more severe than in prewar days.

Competition is here. That it has not been greater these past few years is due to the war program. No competition is ever met successfully by subsidies, by threat, by buying it up, by under-rating, by tearing down. Every one of these methods has been employed at one time or another and found wanting.

The logical way to meet competition is to render a superior service and to sell it intensively.

New Problems In Inductive Coordination

Power and telephone engineers investigate possible increase in telephone interference resulting from bad wave form of fluorescent auxiliaries and new industrial devices. Filtered ballasts may be necessary

"THE effect of fluorescent lighting and other new industrial applications on telephone influence of distribution systems was one of the subjects discussed at recent meetings of the Pacific Coast Electrical Assn., held in San Francisco and Los Angeles. The two papers given at the northern meeting are here presented. The first, by W. R. Johnson, PG and E, presents the problem from the power engineer's standpoint, and the second, by Stanley Rapp, Pacific Telephone & Telegraph Co., indicates the communications engineer's interest in the subject.

Power System Problems

W. R. Johnson

THE electric power distribution engineer is ordinarily concerned with large quantities of a single-frequency alternating current. The telephone engineer must deal with the entire range of voice frequencies and currents of small magnitude. Unfortunately, electric power circuits often produce currents and voltages of higher frequency than 60 cycles. By electromagnetic and electrostatic induction these higher frequencies are sometimes reproduced in neighboring telephone circuits. This general problem is well known and widely treated in the literature on inductive coordination. Our present discussion and demonstration is intended to show, at least qualitatively, how this general problem is related to certain industrial applications now coming into widespread use.

The mathematician can show that a sine wave voltage applied to circuit with "linear" elements will result in undistorted sine wave currents of the same frequency. Examples of "linear" loads are the ordinary incandescent light, resistance heating devices, and magnetic circuit devices operated below the saturation level. An oscilloscope photograph of the sine wave current of a 40-watt incandescent lamp is shown in Fig. 1.

When a device does not respond in direct proportion to the applied voltage or current it is a non-linear circuit element and application of sine wave voltage produces a distorted current wave, i.e., a current containing frequency components of a higher order. A transformer operated past the knee of the saturation curve is a familiar example of such a device. Another non-linear device is an electric arc, as for example in arc-welding. Difficulty has been experienced with telephone interference of a feeder serving a large arc welding installation.

Related to the electric arc is the gaseous discharge, as in the case of a fluorescent lamp. All such lamps are operated with a series ballast device which provides the high voltage used in starting, offsets the negative volt-ampere characteristic of the gaseous discharge, reduces the variation in lamp output with applied voltage fluctuations, and smooths out some of the distortion in current wave shape. With a ballast consisting of a straight inductance, such a unit will have a power factor of less than 60% and a current with harmonic content as follows:

Third, 23%; 5th, 2.2%; 7th, 2.2%; 9th, 0.2%; 11th, 0.2%; 13th, 0.1%; 15th, 0.1%; 17th, 0.05%; and 19th, 0.07%. An oscilloscope photograph of the wave form of this ballast is shown in Fig. 2 at bottom of page.

In Fig. 1 on the left is shown the pure sine wave current of a 40-watt incandescent lamp. To the right in Fig. 2 is the wave shape of a single-lamp fluorescent ballast without power factor correction with some distortion

Pacific Gas and Electric Co. now requires all fluorescent lighting to be corrected to 90% P.F. When the single-unit lamp ballast is corrected to about 94% P.F. by shunting a 4.94 mfcl condenser across the input in the conventional manner, the harmonic content of the current increases to the following:

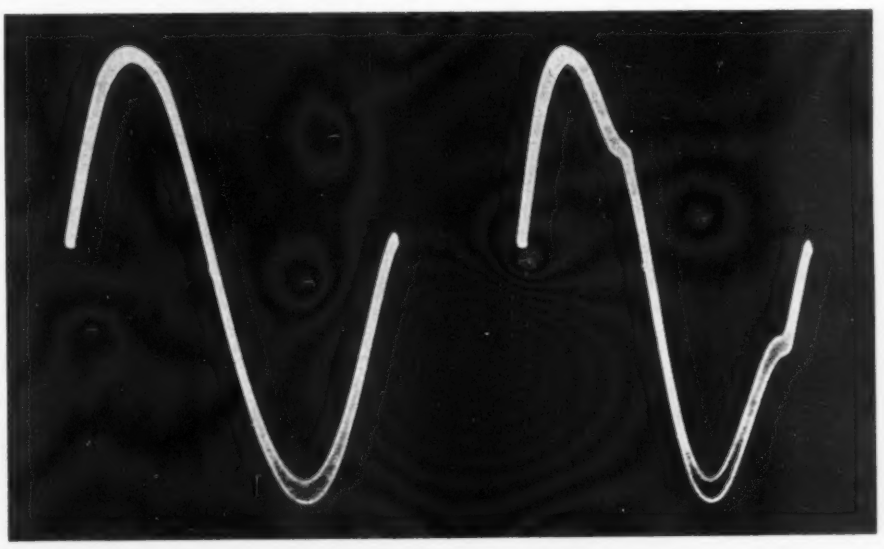
Third, 50%; 5th, 2.2%; 7th, 3.3%; 9th, 0.4%; 11th, 1.8%; 13th, 1.4%; 15th, 0.25%; 17th, 3.0%; 19th, 1.2%; 21st, 0.5%; 23rd, 0.3%, and 25th, 2.5%. Wave form of this unit is shown in Fig. 3.

The popular two-lamp unit has a phase shifting ballast arrangement, primarily to reduce stroboscopic effect, and at the same time resulting in a power factor substantially equal to unity so that additional correction is not required. The harmonic analysis of a typical F-lamp ballast yields:

Third, 27%; 5th, 1%; 7th, 0.8%; 9th, 0.3%; 11th, 0; 13th, 0.15%; 15th, 0.1%; 17th, 0, and 19th, 0. The wave shape of this ballast is shown by the oscilloscope curve of Fig. 4.

The worst offender, from harmonic distortion, is seen to be the single lamp, power factor corrected ballast. This is due to an effect with which we have already had experience, the fact that a capacitor will amplify harmonics which may be present in a small degree.

We are well aware of the increase in fluorescent lighting applications. An



analysis of this trend is illustrated by the fact that whereas total fluorescent lamp sales in 1941 were about twenty million units as against nearly seven hundred million for large incandescent lamps, figures released by the War Production Board showed that 57% of the 1943 dollar value production of lighting fixtures was of the fluorescent type. If the future lighting load has a large proportion of the fluorescent type of unit, we may have reason to become concerned over the harmonic distortion present in distribution feeders, both as regards telephone interference and reduced circuit capacity.

It is not meant to imply that fluorescent lighting be discouraged or condemned on this account. It is only suggested that engineers remain aware of this problem and alert to the difficulties that may be encountered. The trend in fluorescent lighting does not indicate a widespread use of single-lamp fluorescent units, the worst offenders from harmonic production. A "T" circuit ballast (including power factor correction) has been described by Peterson and Blakeslee in *Electrical World* for Jan. 25, 1941. Such a ballast will give nearly an ideal sine wave current, but probably is more expensive to make.

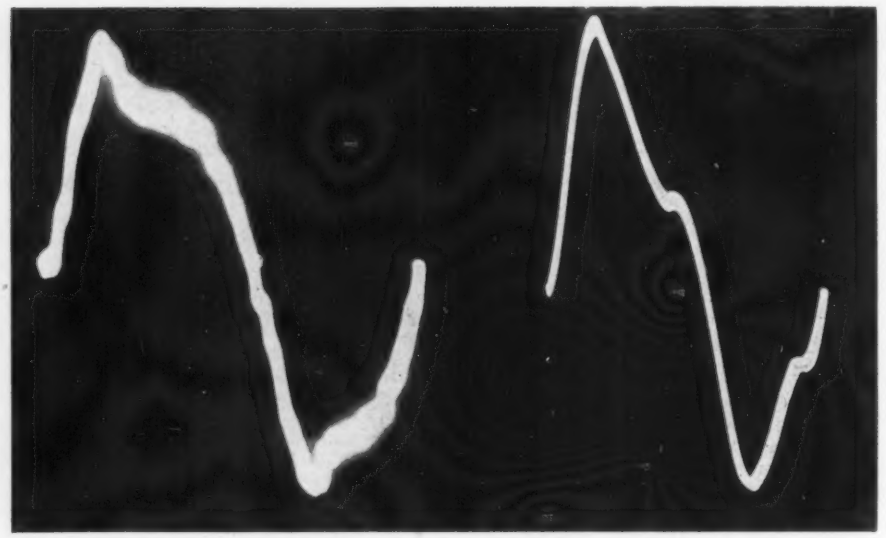


Fig. 3 on the left shows the wave shape of same single-lamp ballast after adding a condenser to correct power factor. Wave shape is badly distorted and TIF is high. Fig. 4, right, is wave shape of conventional two-lamp ballast

Telephone Problems

Stanley Rapp

AS Mr. Johnson has developed, the interest of the communications engineer in fluorescent lighting and similar types of equipment arises because these equipments may be sources of frequencies important in telephone communication. Other than fluorescent lighting equipment, mercury arc rectifiers, arc furnaces, and arc welders are examples of equipment which involve this problem. Probably the mercury arc rectifiers have received more attention than the others in this respect because of the large capacity installations of this type of equipment which have been made at plants for aluminum or other light metal production. At the Riverbank plant near Modesto, there is installed 84,000 kw. of such rectifiers.

In these large rectifier installations, the phasing of the various groups of rectifiers of which they are composed is so arranged as to reduce very greatly their harmonic output. In spite of this measure, however, those installed in the Pacific Northwest area have occasioned a serious increase in the inductive influence of the power systems associated with them. The installations in California have been sufficiently isolated, or their connections with the power supply so arranged, that the phasing of the rectifiers has been effective in avoiding inductive effects on the telephone systems.

In the smaller rectifiers the multiphasing arrangements are not available, and they are more likely to be supplied from the normal power distribution networks. They are somewhat more likely therefore, to be a source of noise troubles than the larger ones. This condition is also true of arc furnaces and arc welding equipments. Some may recall our concern over the rectifiers associated with the Shipyard Railway in the East Bay. This installation did cause some noise trouble, but for various reasons the effect was limited; and other mitigative measures available were sufficient to correct the noise that did appear. If this railway becomes a permanent feature of the Bay Area, the installation of filters at the rectifiers might be desirable.

None of the fluorescent lighting installations thus far have occasioned serious trouble, although there have been a number of rather large capacity installations of this sort in southern California. Where the large installations have occurred, however, there was requirement for sufficient additional load that made necessary a supply from a main transmission line, and these installations do not concern, therefore, the usual power distribution networks. Where the smaller ones have occurred, which are fed from the distribution systems, other conditions have entered to reduce the coupling between the respective circuits, the telephone circuits being generally in cable and the exposures to the power lines, short, so that their effect has generally not been noticeable.

There have been one or two cases of relatively small rectifier installations which were supplied by way of a long leg from the power distribution network, and with the communication circuits carried jointly on this leg. These have given trouble, and are the type of specific situation where a large fluorescent lighting load might give trouble.

The fundamental concern of the communications engineer with respect to the usage of this type of equipment is that it tends to increase the inductive influence of the power system. If the general lighting load is to become of this type in the future years, its effect in this regard may become important. To increase the inductive influence of these systems would be to reverse the development of the power systems which has been our experience during the past 30 years or more; and for that reason itself it is well warranted to examine the conditions under which these equipments might be used and what means are available to offset such a tendency.

The term "TIF" to many is as yet unfamiliar. It is, in the current mode, an abbreviation of the term "telephone influence factor." It refers to the harmonic content of a voltage or current wave with respect to how much noise that harmonic content might make in a telephone circuit. Equipments are available by means of which the TIF of any particular voltage or current wave may be measured, and such measurements are of value in determining the possible inductive influence of a power system or of an individual piece of equipment. They are made by the use of networks which weight

the various frequencies composing any voltage or current wave so that their effect on the indicating meter is proportional to their noise making ability.

(A demonstration was then made to show what TIF might be and to show what effects some of these equipments have on the current wave shape. The wave of the current appeared on the screen of an oscilloscope and the noise it made in a telephone circuit was heard through a loud speaker. The equipments consisted of an incandescent lamp, a two-tube fluorescent lamp equipped to avoid stroboscopic flicker, a single tube fluorescent lamp, and a condenser to equip this last so that it had approximately unity power factor.)

The purpose of the demonstration was by no means to discourage the use of any of this type of equipment, but to acquaint engineers with the possible problems of inductive coordination which may be associated with their use. It is to be noted with respect to this lighting equipment, that the one which gives the best lighting service (less stroboscopic flicker) has good power factor characteristics and has the least inductive effect. So the communications industry is in step with the electric power industry generally to sell a better grade of equipment to the customer as a means of obtaining the best over-all service for him.

Colour Bar—A Complicated Naval Occasion

N. G. Strong
Lieutenant R.N.V.R.

This humorous account of an experience by men of the Royal Navy with the intricate and color-coded wiring system on an American warship is reprinted from "Electrical Review," London

SHE was an American-built warship, English manned. As our motor boat came alongside and I looked up at her towering sides, I couldn't think what was wrong. It was when I was climbing up the pressed-steel ladder over her side that I suddenly realized. No rivets. All her plates were flush, and welded. So were her decks when I stepped on them. They sprang and clanged underfoot. The Engineer Officer, a two-and-a-half-ringer, R.N.V.R., was waiting for me:

"Good afternoon. You come about the degawsing?"

"Yes, sir. I expect we'll soon have you right."

"H'm. She's American built, you know. Been on one before?"

"Er—well—not exactly, sir. But we've had some lectures."

"H'm. Well I'll hand you over to our E.M." (electrical mechanic.)

I felt unconcerned. Not because of the lectures, but because I was accompanied by my Chief Petty Officer, an experienced T.G.I. What he didn't know about electricity in ships—well, I certainly didn't. He would stand no nonsense from a few Yankee volts.

The E.M. was English all right, but he'd been standing by the ship when she was building, and had become slightly Americanized. For one thing he was dressed in a two-piece boiler suit, in green-khaki linen. He tried to explain the trouble, which seemed obscure. It wasn't until he started talking about "the outside mains" that I realized it was a three-wire d-c system. It seemed that when he switched on No. 1 coil in reverse, No. 2 ammeter showed 30 amp. and the compass turned with the ship's head.

"Ah, some sort of earth, I expect," I said airily. "We'd better 'Megger' it first. Where's the control panel? In some dark and steamy corner of the engine room, I suppose?"

"No, sir," the E.M. looked reproachful, "we got a Dee-Gawzing Room."

A D.G. *room!* These Yanks had the right idea after all. He led the way through the wheelhouse, into the chartroom, and pointed to a large control panel covering the after end of it.

"That's one wall of it, as you might say, sir. The rest of it's through here." He went out of a door, down an alleyway, and in through another door. "That's the back o' the panel," he said simply.

I gazed at what looked like a stage lighting switchboard. It seemed rather an elaborate arrangement for switching on juice. I asked him to fetch the Chief, who was still in the chartroom with the "Megger." He knelt down at the panel, slipped out a large bolt, and shouted to the Chief through the resulting hole. The Chief brought the "Megger," the E.M. connected up the leads, and handed me two ends. I touched one on the framework and one on a sort of busbar thing.

"All right," I said, "grind away." He ground.

"Ground," he said briefly.

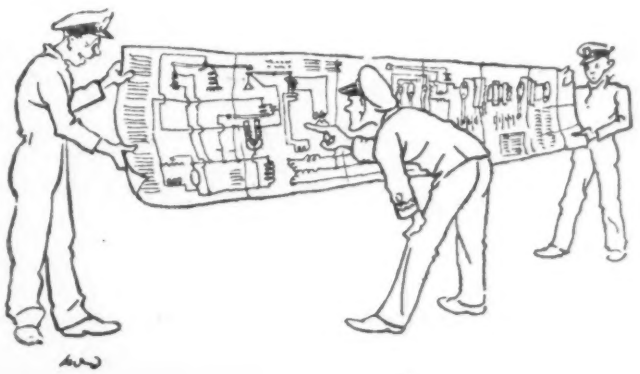
"What reading?" I asked impatiently.

"Ground—er—that is—earth, sir."

Have to try a process of elimination, I thought. Start with the compensating coils, it's often those. But after gazing helplessly at the complicated wiring for a minute or two I asked the E.M. to fetch the drawings.

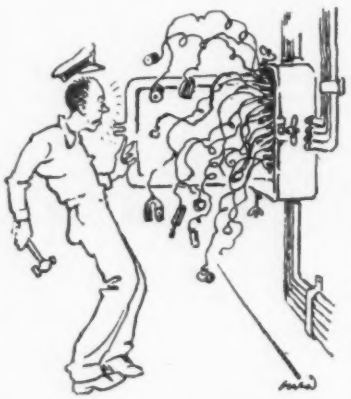
"The *drawing*, sir," he amended, and disappeared, to return in a few minutes with a rolled up blueprint. He suggested we take it into the alleyway to look at it. I couldn't think why, till he unrolled it. It was 24 in. wide, and *fourteen feet* long! I know; I measured it out of curiosity. The complete installation, in every detail, was on the one drawing, together with about 3 ft. of instructions and an axionometric projection of the layout. I got them to hold the ends, whilst I tried to browse up and down, but we blocked the alleyway too much.

So, with the Chief at one end in the chartroom, we fed it through into the wheelhouse. I left the E.M. there, and went back to the D.G. room. After a



bit I found two leads which looked as if they might feed the compensating coils. I looked in vain for the numbered tapes, to identify them off the drawing, but could see only coloured braid. I knelt down, withdrew the bolt, and shouted to the Chief: "What part are you at?" He walked up and down the drawing a few paces.

"Seems to be about gas, sir. Calor codes, it says, whatever that means." I remembered something from the lectures.



"Not Calor, Chief. 'Kollor.' It's American for colour." I heard him snort. I referred to my pair of leads again. "Well, Chief, see if you can find—er—orange and black. And ask the E.M. what part he's got." I heard him shouting, then a telephone rang beside me. I took it off its hook on the bulkhead.

"E.M. here sir," said a voice. "I'm in the wheelhouse. I've got the part with the compensating coil circuit, and another colour code. There's no orange and black, but there's yellow. Would it be that?"

Well it might have been, in that dim light, and the black may have been splashes of varnish, so I told him to make his end of the drawing fast and bring a torch. A few minutes later a dazzling white beam filled the D.G. room. "Wh-what?" I stuttered, shading my eyes and looking around. The E.M. was carrying a sort of portable searchlight, about the size of a bucket. "It's what they issue us with over there," he said, a little apologetically. Just then I found my own torch, and switched it on for comparison. It seemed to cast a shadow.

Well, the orange certainly looked yellow now, so I told him to disconnect the pair. But he pointed out that they were soldered, following American practice, and it was a solid circuit right through. All the joints were sweated, and there were no fuses. I thought the trouble was most likely in the compensating coils themselves, and that we might as well unsweat the other ends of the leads, so we went to have a look. The ones in the wheelhouse seemed all right—nice and watertight—and we clambered up a pressed-steel ladder on to the upper bridge. Here they are exposed to the weather, and the damp and salt sometimes get in, even in American ones. We followed the leads up through the deck, till they separated into three resistance boxes. Then they joined again and fed into a junction box at the foot of the binnacle, before separating again to the various coils. The junction box seemed the best place to test from, so the three of us got to work chipping the thick paint off the joint and undoing the screws. Then the Chief gave it a judicious blow with a hammer, and the lid fell off.

It was like disemboweling a cat. A mass of brightly coloured entrails disgorged eagerly into my hands. There were braids of every conceivable colour and mixture of colours. Blue and red, gold and red, green and blue, green and red, white, black, maroon, everything. Yards of wire came cascading out, like a conjuror producing paper streamers. In the center was bolted an ebonite spreader, in two halves, carrying in a row of grooves a number of tinned brass strips, to which the ends of the leads were soldered. It was difficult to get at, however, so probing inside I undid the two screws which held the spreader to the back of the box. Unforunately they were the same two screws which, with American efficiency, held the halves of the spreader together. It was just like undoing a fat man's belt. Everything sagged happily outwards, and drooped on to the deck in a hopeless jumble.

However, our yellow lead was still there, so we were on the right track. But we still couldn't see which coil it fed, so I sent the Chief and the E.M. below to carry up the drawing. Meanwhile, casting caution to the winds, I decided to open the terminal boxes on the coils themselves. I was just ready for the *coup de grace* when the Chief came clambering up the pressed-steel ladder, towing one end of the drawing.

"The E.M.'s on the other end, sir, in the wheelhouse," he puffed.

"Tell him to leave it and stand by up here. I'm going to knock the lid off the terminal box on this coil."

He looked at me mutinously for a full minute, but in the end discipline told. He turned away and called to the E.M. in a strangled sort of voice.

We gathered round the box, I with a raised hammer, but otherwise in the attitude of a wicket keeper. I put the chief at long-stop and the E.M. in the slips. "Play!" I said, and struck. The lid came away, but nothing else happened. We waited a minute and then went forward to investigate. There was a large ebonite spreader, holding three dear little soldering strips. Three leads came into the box: three leads went out again to the coil. One was yellow. "Hail, Columbia!" I said, and snipped it off. We meggered it. Zero. With a wave of intuition I snipped about an inch off the yellow wire, hooked it on to the "Megger" lead, clear in the air, and tried again. Zero. We looked at the "Megger" leads, which were a bit tangled. I was holding two ends of one. The ends of the other went into the instrument, one on each side. The Chief said something about kissing his hand through a ring main, and stood looking up at the mainmast.

But even when we tested it properly, the coil was still earthed. I knew there were two windings in the coil; and there were three leads, so one was probably common. Was it the yellow one, I wondered. The other two were not coloured at all, the braid having been stripped back to the gland. A real good go at the drawing seemed our only hope. I briefed the other two. The Chief would remain on the bridge, as Captain of the Colour Codes. The E.M. would be in the wheelhouse, standing by the compensating coil wiring end of the drawing. I gave them "Action Stations," and waited. The E.M. went below; the Chief knelt on the deck, crawling along the drawing and peering. He was muttering, "All on the black."

No word came from the E.M., so I bawled over the side of the bridge to him. A quiet voice somewhere behind me said: "E.M. here, sir. You don't have to call, sir. There is communication." I looked round. The voice was coming out of a loudspeaker thing behind me. It went on: "If you wish to speak, there is a hand microphone just by the loudspeaker. Press the switch down first." I found it and pressed the switch. "This is the D.G. Officer—" I said, and stopped. A greater voice than mine had interrupted, booming out over the water, its echoes flung back by the distant hills. "This is the D.G. Officer—" it said, and stopped.

The E.M.'s face appeared at the top of the pressed-steel ladder, looking rather red. "Switch *down*, sir. Not up. That's for the loud-hailer on the mast." The face disappeared. Suddenly the Chief's muttering grew more excited. He had crawled to the side of the bridge, one finger still tracing along the drawing. He started to climb down the ladder slowly, hanging on with one hand, his eyes glued to the drawing. At each rung his foot made a large hole in the drawing.

"Did you say yellow, sir?" he shouted. "I've got it. It says QG1MS." "QG1MS?" asked the loudspeaker. "I've found that here, sir. It says—er—it says—er——" "What?" I asked the microphone testily. "SPARE" boomed the loud-hailer overhead; and the Chief fell off the ladder, half-

lapped with blueprint. "Did you say the Yanks was on our side, sir?" he asked plaintively.

In the end I decided to unship the coil and open it up. It was in a metal case, in two halves, and thickly painted. I couldn't quite see how it came apart, so we thought we would let the workshop do it. We took it ashore, and duly handed it over to an L.T.O. I looked in a few hours later. The coil was lying on the bench in two halves. Inside was a tortured mass of copper and charred insulation.

"Ah!" I said to the L.T.O. "So I was right. It was burnt out?"

"Can't rightly say, sir. The two 'alves was sweated together. We 'ad to open it up with a blowlamp."

So now I shall never know where that earth was.

Field Dispatching With Two-Way Car Radio

W. L. Campbell
Communication Engineer
Northwestern Electric Co.

GREATER loading of lines and equipment has increased the possibility of power failures and hazards. At the same time, it is necessary that outages of service to wartime loads be reduced to the minimum by immediate repair of power company facilities. To aid in line maintenance, to speed restoration of service, and to facilitate the building of line extensions, a fender mounted speaker and an auxiliary source of power for the car battery have been incorporated in the radio equipped car of the line superintendent of Northwestern Electric Co.

The old "mouth to ear" method of giving orders sometimes resulted in misunderstanding and delay and could result in loss of life or property damage. During times of major power interruptions when it is of utmost importance to restore service and when men are working under strain, it is difficult to give orders to men on different poles at the same time or to hear their replies. Particularly is this true during inclement weather or where there is a predominance of traffic noise present. A fender mounted two-way speaker acting as both transmitter and receiver proved to be the solution for this problem. By using the car receiver audio system and transmitter microphone, and by adding a loudspeaker, two six-pole double-throw switches, a double-pole double-throw switch, a relay, and a microphone transformer, a versatile arrangement was obtained.

In the block diagram, Fig. 1, when switch No. 1 is up, (normal position), the car receiver is left clear for calls from the load dispatcher and the microphone clear for ordinary transmitter use. When both switches No. 1 and No. 2 are in the down position, the "mike" feeds the outside speaker through the receiver audio amplifier. By changing switch No. 2 to the "up" position, the outside speaker acts as a "mike" feeding the receiver amplifier to the car set speaker and permits the superintendent to hear the men "hollering back". To permit the line superintendent to receive calls from the radio dispatcher when he must be away from his car, the toggle switch is thrown to the "on" position. This parallels the outside speaker with the car set speaker and permits calls to be heard clearly for a considerable distance.

Because of the heavy drain due to radio, headlights, spotlight, and other accessories, the car battery would run down in a few hours. This often occurred at night during emergencies when it was very difficult to secure replacement and when it was most necessary to have the equipment in operation. To supplement the car generator and to keep the battery adequately charged, a 150-watt Delco gasoline driven generator was mounted under the hood with controls mounted on the dashboard. This unit charges at the rate of 18 amp. and during the daytime is ample for car heater, transmitter and receiver. For nighttime use when all accessories and lights are in operation and drawing approximately 30 amp., the Delco unit and the car generator carry the load and in addition furnish substantial charging current to the battery when required. Under continual operation, the engine for the auxiliary generator operated 13 hours on one gallon of gasoline.

Photographs of the loudspeaker and radio car are shown, as well as a wiring diagram of the loudspeaker installation. Incidentally, it was necessary to secure a permit from the City Nuisance Division before the loud-

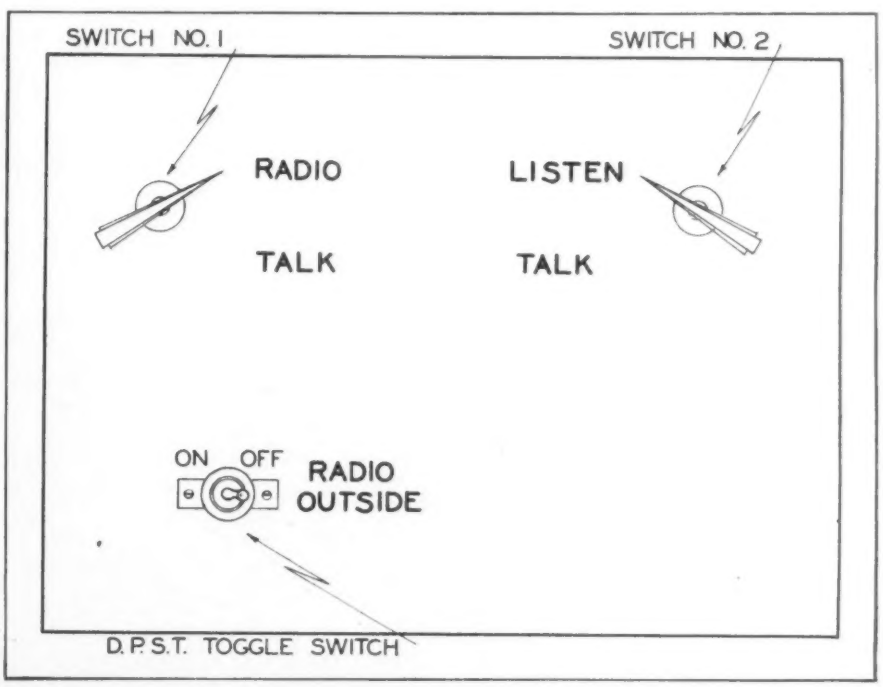


Fig. 1—Shows switching arrangement for use of the radio and loud speaker

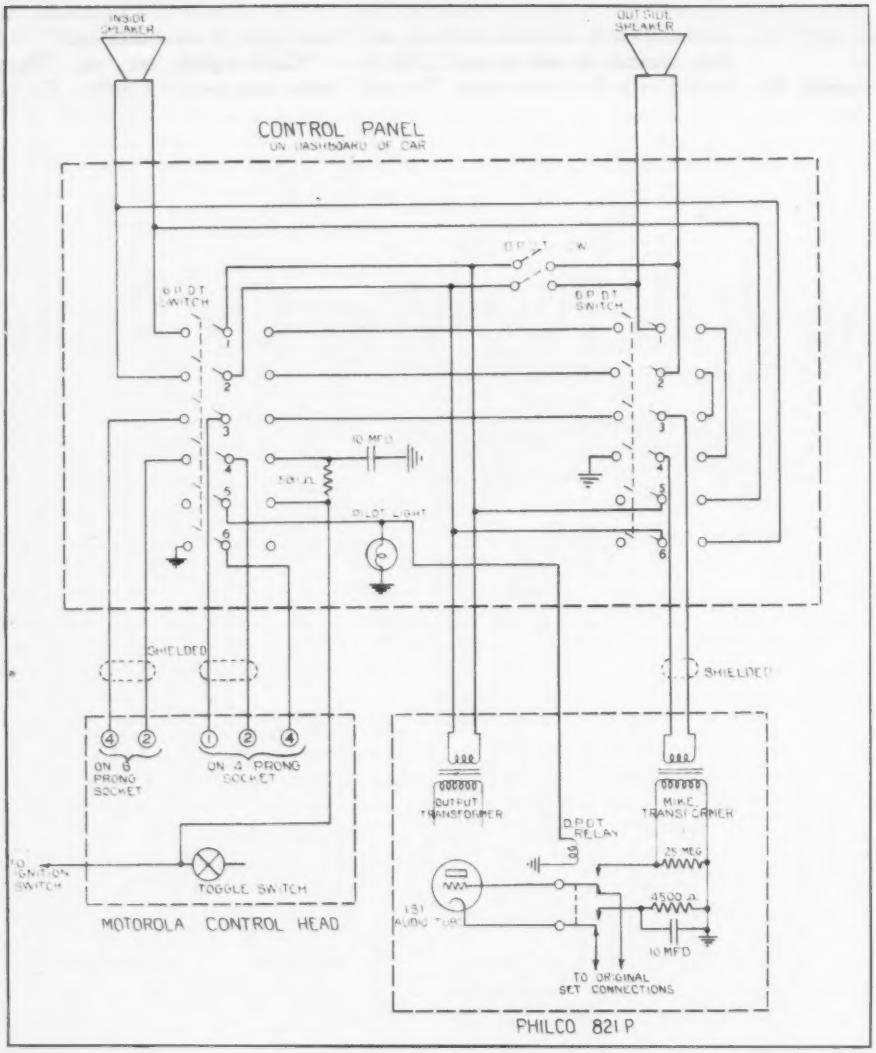


Fig. 2—Wiring diagram for modifying car radio to use fender mounted loudspeaker as microphone for 2-way talk

speaker could be operated in the city.

So far as known, speaker installations on police and utility cars are only *one way* in order that the driver may direct a message over a considerable distance not obtainable without amplification. The installation described is *two way* with the answer being received by the *same* loudspeaker and amplified to the driver in the car. Moreover, previous installations have been confined to two-way cars because they had audio systems of 10 watts or more. With the system described, a two-way public address system has been accomplished with a one-way car (receiver only) as 2 watts of audio with a 15-watt permanent magnet speaker that can be heard clearly more than two blocks away.

Left: Line Superintendent D. L. Hiatt sits in car and talks to linemen on poles. Right: Fender-mounted loud speaker serves as microphone, picking up distant voices of the line crews

Utility Solves Tree Problem

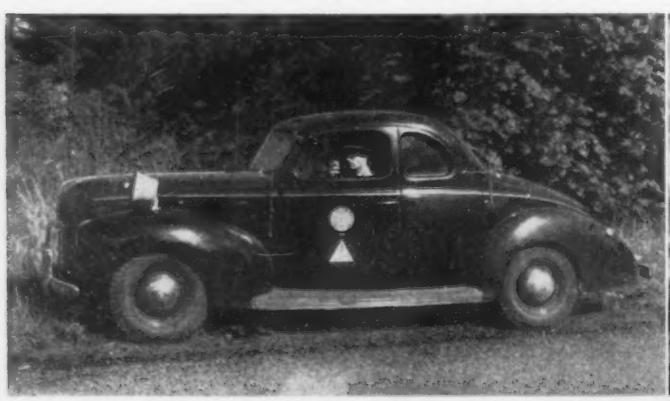
E. B. Hornbaker
Southern Colorado Power Co.

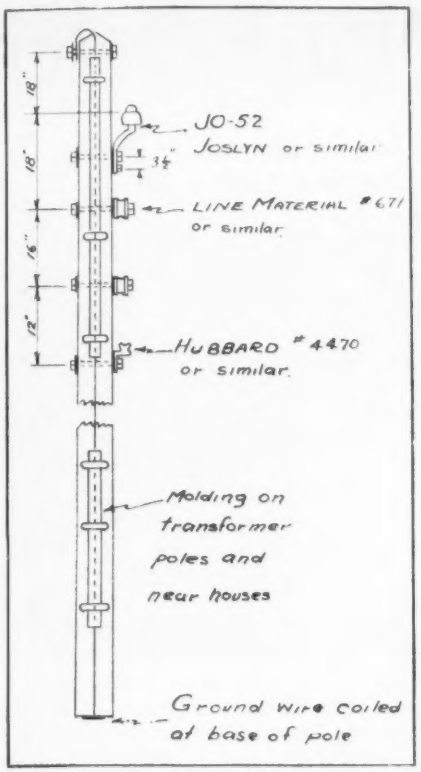
SOLUTION to an aggravated tree problem in one of the cities served by Southern Colorado Power Co. has been found in the rather unconventional type of construction illustrated. Mounting primary and secondary wires vertically offered part of the solution, but the innovation that really spelled success was placing the common primary and secondary neutral wire on the top of the pole as shown.

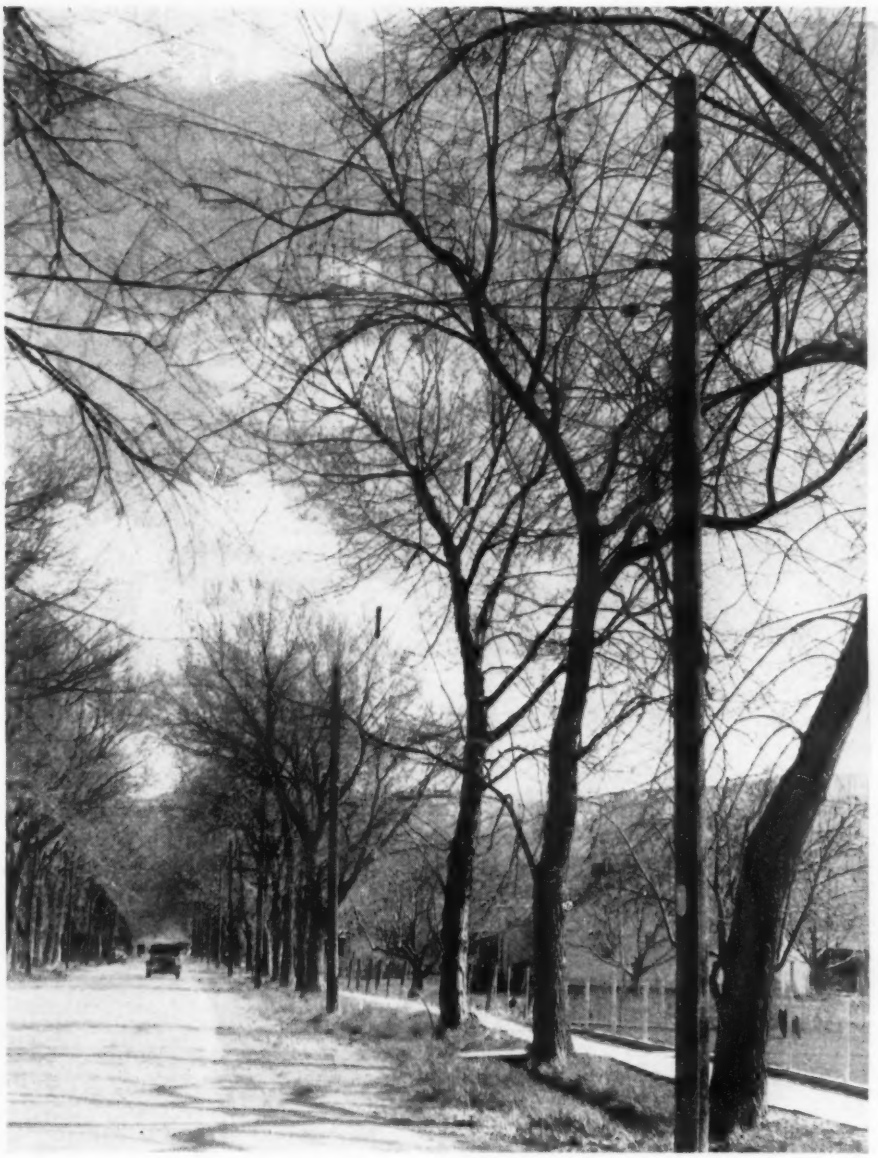
An important feature of the idea is in using a high-strength conductor for this common neutral so that falling limbs and sagging branches cannot get into the single primary conductor below. As indicated on the drawing, the common neutral is a No. 2 Copperweld wire with breaking strength of 5,890 lb., which provides both the high strength and the conductivity needed.

This type of construction is used extensively in Canon City. On streets where there is a tree problem a 4,000-volt tree wire is used for the hot leg, otherwise No. 6 bare hard-drawn copper is employed. Several schemes were tried for attaching the common neutral to the pole, such as two- and three-bolt clamps and patented clamps, but so far the cheapest method found is just a through bolt with two round washers and a piece of ¾- or 1-in. pipe about an inch long between the washers. A cushion type of tie used with insulators is employed for tying-in the conductor with the pipe nipples.

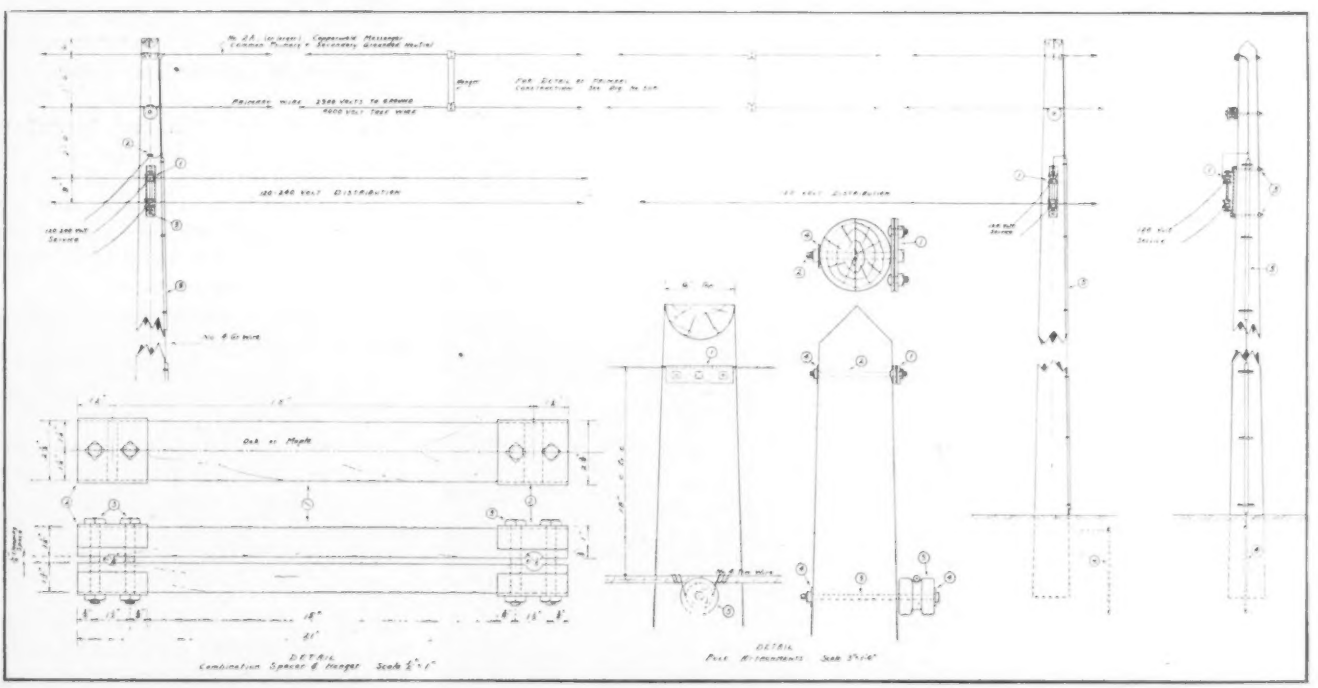
To prevent limbs from weighing down the ground wire so that it would come in contact with the hot leg 18 in. below, the wooden block spacer clamps illustrated are used. On poles where there is secondary, a tap is run down the pole to the secondary position from the overhead ground wire. This type of construction was first used in 1934, and has proved an entirely satisfactory solution to a most difficult problem.







Southern Colorado Power Co. solved a difficult tree problem by placing a high-strength common primary and secondary neutral conductor in the top position on poles and running a 4-kv tree wire below. The high-strength common wire takes weight of broken and sagging limbs and prevents breakage of hop phase wire. Separation in midspans is maintained by wood spacers as shown. Neutral is tapped and run down poles where services take off. Operating experience very good



Prewired motor and main switchboard panels were lowered through hatches to proper compartments, then connected to cable system. At right stands Jack Cimino, electrical superintendent

Drydocks on Rush Order

How one of the war's large electrical contracts for mass production of auxiliary repair docks was done

WHERE THE AXIS made its mistake was to start a war of mobility against probably the most mobile nation on earth. When Japan looked at a map, it felt safe in attacking Pearl Harbor because its own bases were near while those of the United States were so far away. But it did not reckon that the U. S. could make mobile bases and take them into their own waters, from which to exchange blows at close arm's reach.

One major item in the mobility of the United States Navy has been the perfection of floating drydocks, large numbers of them, that could be taken relatively close to the theater of action and there render first aid to ships damaged in action or requiring repairs for any other cause. It is one thing for a crippled ship to fight its hazardous way, limping across a 6,000-mile ocean. But when a repair dock is within a few miles, its chances of recovery are better and it can the sooner return to the fight.

When the war started, the U. S. Navy had one single floating drydock. Now it has so many it would give no comfort to the enemy to know the number. They have been produced in the incredibly short space of two years, the last of them taking but 60 days from laying of keel plate to commissioning fully equipped.

In this program Westerners played a very important role. Nearly all of the drydocks were built in Western yards. Several of even the largest floating docks were built in Coast yards. The largest number of a standard type, capable of handling destroyers and such vessels, were awarded the Pacific Bridge Co. as prime contractor, for which Abbett Electric Co. of San Francisco was the electrical contractor. This turned out to be one of the war's largest electrical contracts, a lump sum contract on a renegotiation basis, totaling over $5,000,000, and calling for more engineering and development work on the part of a contractor than is usual.

Originally the contract, let in 1940, was for two such drydocks, under a time allotment of 237 days. Before the first one was completed the quantity had been advanced to five more, then six and seven and, after Pearl Harbor, in groups which made an incredible total of these auxiliary repair docks.

Electrical facilities, too, were increased as the work progressed. The original ARD vessels were specified for a minimum of equipment. Some of the last ones were likewise fitted with a minimum of equipment because they are to be used near shore facilities which will provide the power. However, most of them carry an ample power plant to take care, not only of the repair power and the operating of the dock itself, but to furnish power for the vessels which may be under repair within their basins.

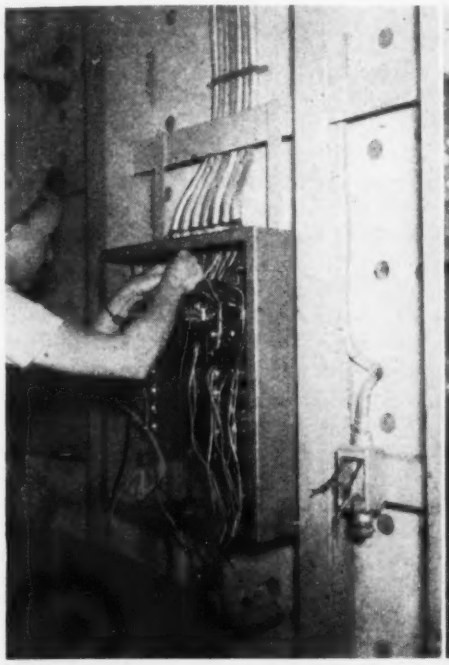
Roughly these ARD vessels are about 500 ft. long with a basin about 70 ft. wide which can accommodate a light cruiser, destroyer, submarine or any vessel of that size and length. The dock itself draws but 4 ft. of water empty and very little more loaded, can be submerged to a depth of 35 ft. to admit a vessel and lifted back above water for repair work in the dry.

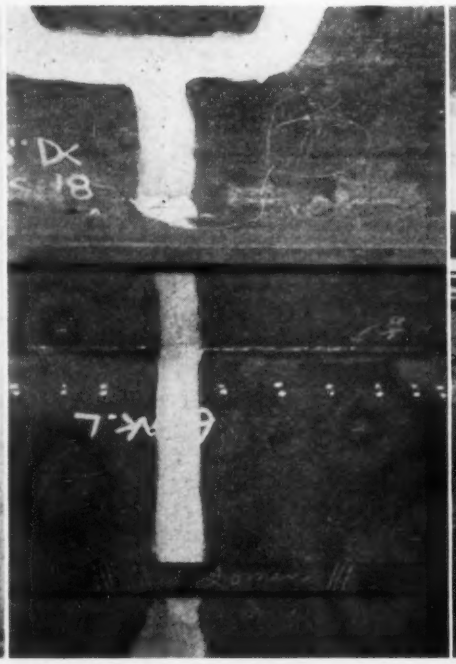
Ample Power Plant

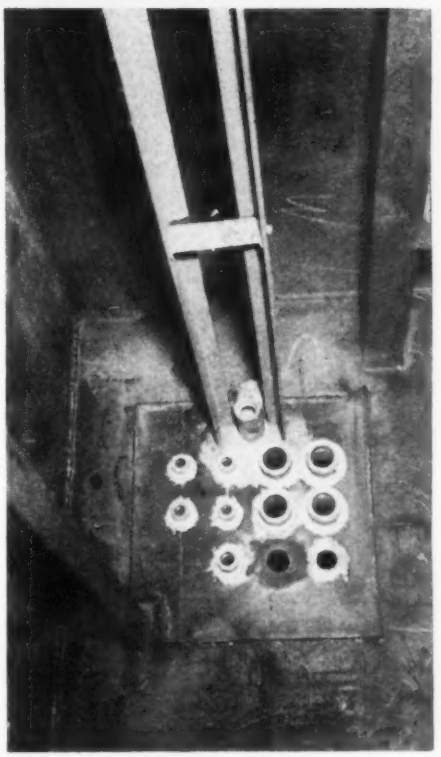
Electrically each contains a power plant and electrical facilities that make it completely independent of land supply, no matter to what jungle island it is towed and anchored to get to work at its repair job. It also provides ample quarters for officers and crew, storage for food supply and machine and electrical shop facilities and materials sufficient to handle even serious repair problems.

The main power plant consists of three 210-kw. and one 100-kw. diesel-electric generators driven by 375-hp. and 150-hp. diesel engines. Generation is at 440 volts, three phase. Power goes through a main switchboard where it is distributed through panels and switch gear to serve all lighting and power requirements. Lighting is supplied by 230/115-volt single phase

Threaded studs were welded to steel with a stud welding gun. Cables or fixtures later were supported on the studs







Supporting straps for each sub-panel (left) were welded to the cabinets in the shop, then moved as a unit to the compartment designated for it and the straps welded to the steel ribs. Cables then were run in and connections made. Center: studs and space around them painted to permit affixing cable before steel was painted. Right, above: channel iron racking for the cables and supports being welded in place. Lengths were precut at shop for quick fabrication. Right, below: where cables go through watertight bulkheads, watertight sleeves were installed in advance. Angle iron frame to support the cable rack has also been welded in place and the whole assembly painted in advance

and all power 440-volt three phase.

All transformers are of the dry type and they are mounted as shown in the illustrations. There are twelve 5-kw., three 7.5-kw., six 37.5-kw. and six 25-kw. transformers per dock.

Originally specifications called for a main bus of one three-conductor, 500,000-cir. mil cable. This was later doubled. For where shore power is available provision is made at either side of the dock to take it through an incoming shore feeder with a 500-amp. breaker at either side. In fact the backbone of distribution centers around this straight tie across amidships of the dock which is fed by means of 500,000-cir. mil cables in 6-in. conduit between panels and disconnecting breakers. Reverse current relays are used to protect this line against backfeed either from shore power or the dock's own plant.

A ship in the dock under repair can be fed from the dock's power supply main switchboard through the ship service transformers. These consist of two banks of 220-volt, three-phase and two banks of 110-volt, three-phase transformers. Provision is also made for 125/250-volt d-c for submarines and ships that use direct current. This is supplied from a separate 100-kw. motor-generator set. Three of the docks were supplied with Mercury rectifiers instead of the motor-generator sets. These were 187-kw. Ignitron rectifiers and were the first of such rectifiers used for this purpose. Later they were specified in several cases.

Wiring in Racked Cables

The general wiring scheme makes use of marine cable of the shielded type, ranging in size from the largest mil. The number of conductors per cable runs from 1 to 44 and there is of 500,000 cir. mil down to 2,828 cir. approximately 60,000 ft. of such cable per dock.

One of the things the electrical contractor did was to devise a new method for handling the cable. There was more of it to be distributed in this type of installation than in an ordinary vessel because of the power requirements to be served and the compact space. If the regular pan type of construction had been used, there would have been too many cables for the available space. The entire bulkhead would have had to be used in some places to accommodate all the cables and this would interfere with the equipment.

Therefore, the contractor built cable racks in tiers. In some places these tiers are five decks high and carry, in addition to the electrical cables, the copper tubes for the water level indicator system. They carry the cables to the valves, the main feeders, the various power cables. Separate racks are provided for the communication systems cables.

Racks are made of strap iron which was welded to an angle iron frame supported from the deck by welded straps.

To support fixtures and individual short runs of lighting and power cable on the skin or deck of the ship, threaded studs were welded to the steel plates in advance and the area around them painted.

Other equipment electrically oper-

ated and served by the electrical system includes a 125-hp. air compressor driven by a synchronous motor; two 750-amp. welding generators with branch feeders to fourteen 200-amp. outlets equally distributed around the dock and from which leads can be taken into the dock basin and onto the ship being repaired; motor-driven machine tools in the machine shop and various small motors for fans, ventilators and other equipment.

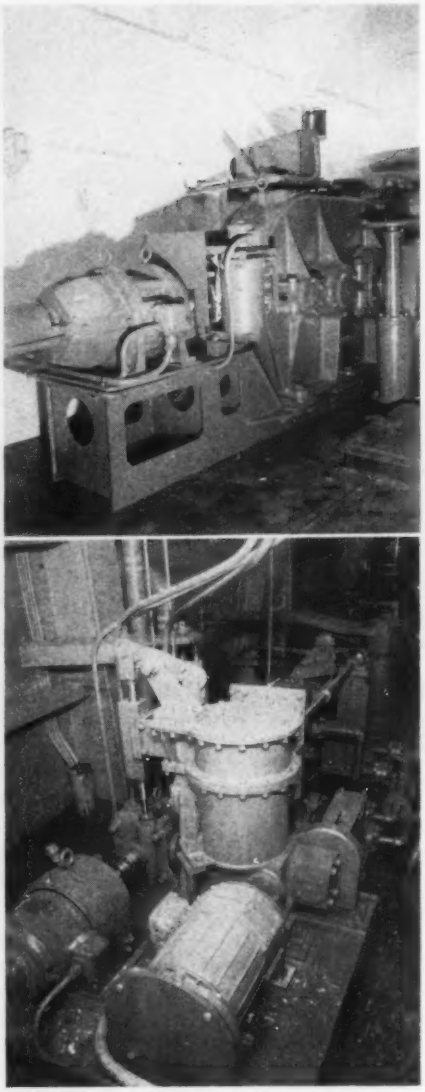
The dock operating equipment itself requires 38 electrically operated valves for the flooding of the submersion chambers and the dock and four 75-hp. pumps to exhaust this water to raise the dock. There are also two 50-hp. fire pumps. The end gate is electrically operated also with synchrotie for equal operation of the chain on both sides of the basin. Steering of the dock under tow is also electrically controlled through a Selsyn generator at the steering wheel with appropriate receivers at the rudder location. The rudder itself is operated by a 200-lb. pressure hydraulic ram for which the Selsyn motor operates the valve.

There are also two stern mooring winches on deck, each with 40-hp. motors and 1,000 ft. of cable to anchors. Other capstans and winch equipment are provided on deck at various required locations.

Cranes to operate on top deck were especially designed by Pacific Bridge. These are diesel-electric. The diesel engine drives an auxiliary generator which furnishes d-c power for the travel motors, one on each side of the crane. The crane spans the deck equipment. Power for the crane itself is from the diesel engine.

To provide lighting both in the basin and along the deck, sockets are furnished for twelve standards which will accommodate 1,500-watt floodlights. Receptacles to which these lamps can be plugged in by means of long cords are arranged along the sides of the upper basin just below the top deck level. The floodlights can be mounted either at deck level or upon the standards. At the same location are provided some three-phase, 440-volt outlets for tar pots, and 12 circuits for portable tools inside the basin.

A special feature of these docks is the water level control system which was developed by the electrical contractor, George Abbett. A pneumatically controlled Foxboro type system of indicating instruments is mounted on two boards in a special control house just below the main pilot house on the boat deck, amidships and forward. This room gives a clear view of the dock so that the operator can watch the operations of mooring and leveling and can remotely control the pumps to trim the dock as required.



Remotely operated from the pilot house are the Selsyn operated hydraulic steering apparatus (above) and the electric drive for gears operating the rear gate, equipped with synchrotie for equal operation of chain on both sides of dock

The pneumatic system has compensating lines and a manual purging system which requires an air compressor. This is supplied by a 5-cu. ft. compressor driven by a ¾-hp. motor.

There is one board for each side of the vessel. Each gives visual indication of all the tanks and lines leading to them, together with push buttons and pilot lights for remote operation of all pumps and valves. The complete submergence operation can be handled by one man. Visual indicators and levels for trimming are mounted at these boards. This task is handled on board by the electricians.

For signal and communication equipment, a separate system was installed. There are 25 telephones of the sound-powered type using no batteries but with magneto ringing. Selector switches pick out the stations. There is also a general alarm system developed by single stroke bells and a General Electric timing device. This can be sounded from five locations. It is accomplished through two timing relays. A public address speaker system of Western Electric using Jensen shock-proof speakers is also installed, having six portable microphone outlets with supervisory control on one outlet.

Although wired for a gyrocompass, none was installed. There is a ship's horn using a specially designed low-frequency siren driven by a 3-hp. motor.

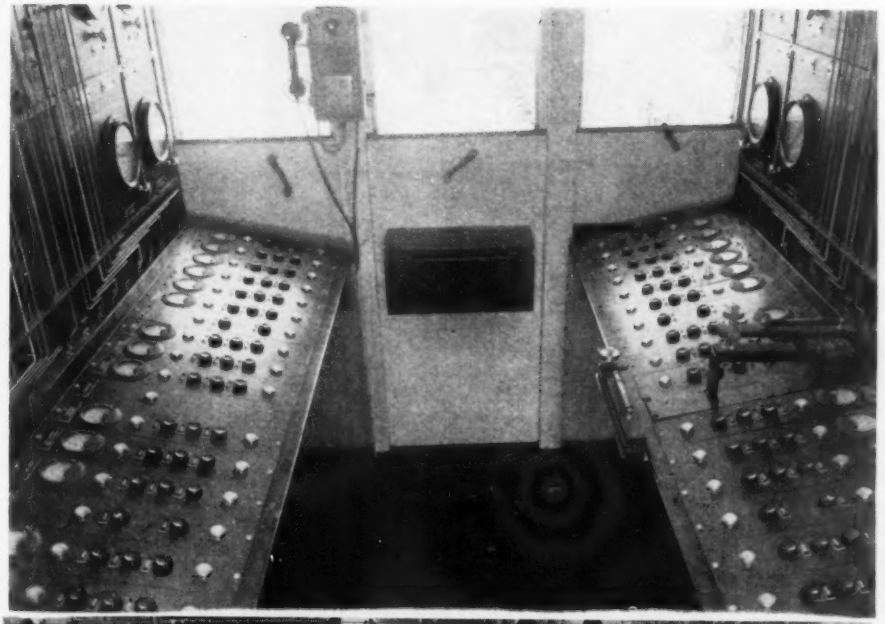
Standard Navy searchlight and running light systems were also installed. The searchlight is supplied direct current by a motor-generator set of 15 kw. There are the usual officers' and crew's quarters, sick bay and hospital, a separate electric shop and a large machine shop. The galley is completely electrically equipped and cooking is done on three Edison Hotpoint ranges. A refrigeration plant consisting of three 5-hp. compressors is furnished to keep meat and food supplies at proper temperatures in ample locker rooms. They are so arranged that each compressor can take care of any one of the locker rooms selectively. There is also an electrically driven commercial laundry on board.

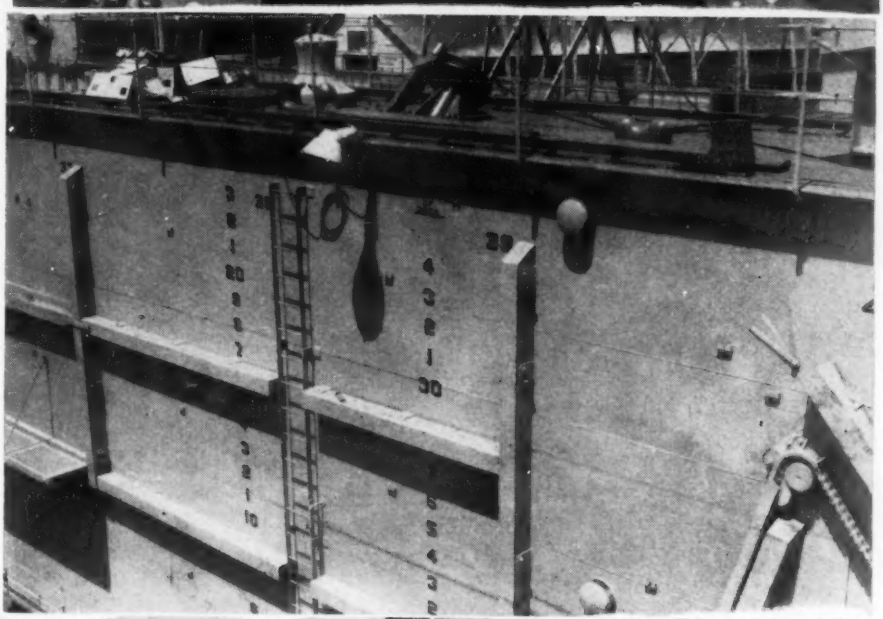
The contractor's organization had to be set up especially to handle this large volume of work expeditiously. Pacific Bridge Co.'s yards at Alameda were under George Mitchell as general superintendent. Chief engineer was G. W. Noe and Richard Holmgran was project engineer. T. H. McNeil was electrical engineer, assisted by Jack Willigus and C. M. Lockhart.

George Abbett's organization at the peak of the manpower consisted of 260 men and women. Jack Cimino was superintendent, being on loan from Severin Electric Co. with two assistant superintendents, Bill Hicks and Paul de Pietro, charged with responsibilities for running the job on each of the usual four docks under construction at one time. E. T. McCarthy was chief electrical engineer. Officer in charge of construction for the Navy was Lieut.-Comdr. J. C. Sease, USNR.

The contractor established both an office and a large shop and warehouse at the Alameda yard. Here much of the equipment was prefabricated, ready to be installed. As each new dock was done, the time required to finish it was shortened until the final one took only 61 days. As a rule four

Water level control panels, with diagrammatic indications, push buttons and pilots and level indicators in room overlooking dock interior (top, right). Center: floodlight and power plug locations along basin rim. Below, left: cable racks, channel iron risers and electrically operated valves. Center, main power plant, rear, main switchboard, right, and power panels. Note fluorescent lighting. Left: typical transformer bank on welded framework



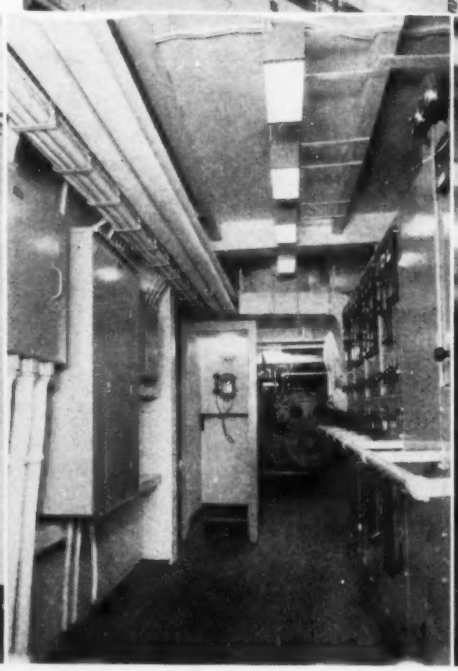


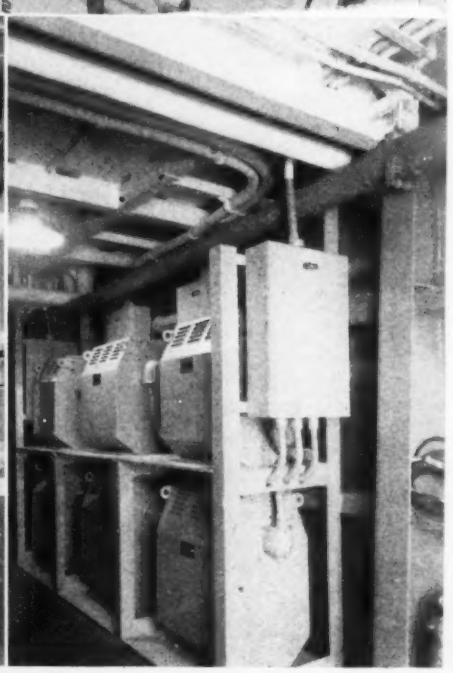
docks were being built progressively, while two were being outfitted. The original contract was let in 1940 and the work has just recently been finished. During the peak period the ARD's were turned out approximately two weeks apart in a continuous line.

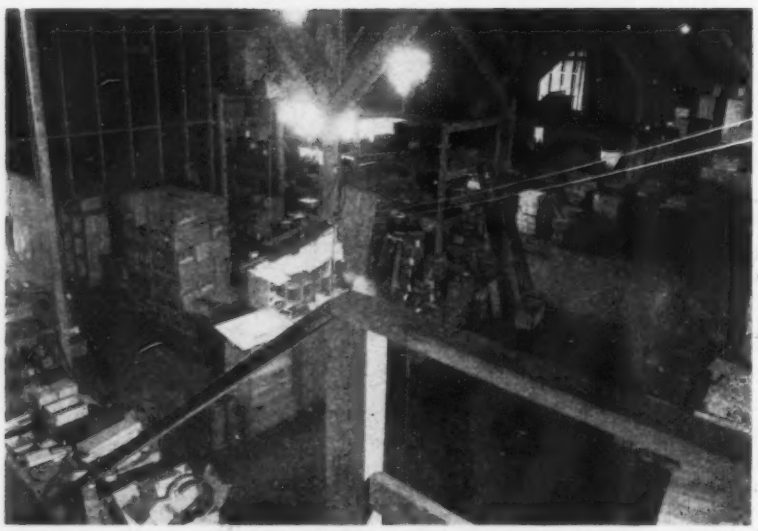
Supplies also were well organized. A material delivery system was set up with dates at which boxes containing all the materials for each compartment of a dock were prepared in advance. These boxes were of different colors, representing the different sides of the dock and were numbered to correspond to the compartment and dock being worked upon. (See page 64).

In the office an elaborate system of charting the progress of each drydock during the progress of the work was maintained. Material control and dispatching contributed to the smooth flow of materials to the large number of electricans employed.

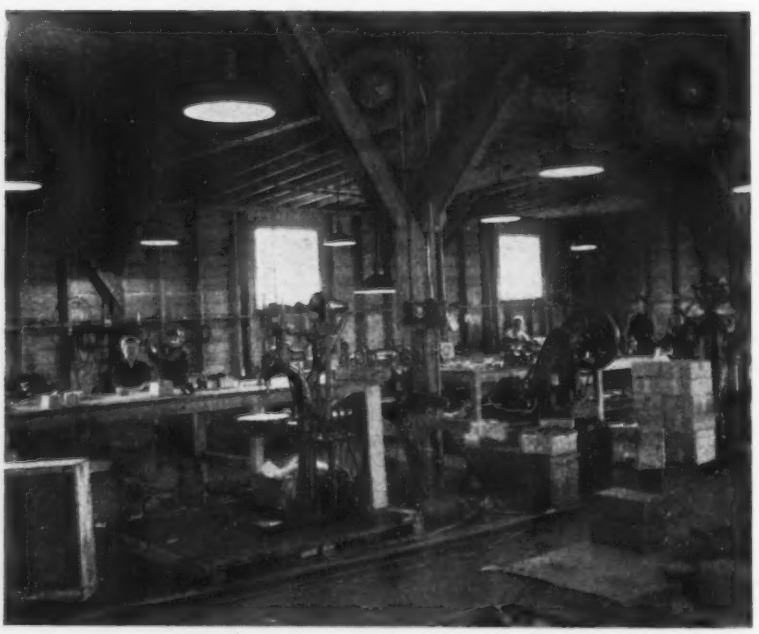
In the entire project the contractor's ability to apply his "know how" and handling of materials and manpower resulted in constantly decreasing costs to the Navy for each dock completed and in consistently shorter time.







With four of these large docks under construction progressively at a time and two being outfitted, it required skillful organization of materials and manpower by the contractor, Abbett Electric Co., to swing the big job along in step with an accelerating construction program. A separate office was maintained in Alameda on the project, with warehouse (at left) and prefabricating shop (below) and an office staff (seen above with contractor George Abbett in shirt sleeves in the center), an engineering staff of several men, a personnel director (T. R. Roach, at the lower left), a large storeyard for cable reels and heavy equipment, a special assembly shop for wiring and piping the water level control boards, and a staff of superintendents and foremen (see p. 110). Electrical materials for each compartment of each drydock were assembled in advance by the warehouse crew, loaded into boxes such as at upper left, labeled and color designated for the port or starboard compartment they were to supply. Daily graphic record of progress against the schedule was charted for various portions of each dock (lower left)



EMEA *Dope Sheet*

Oil Lubrication of Ball Bearings

Prepared by Harold Davis Jr.
General Electric Co., for EMEA of Southern California

GENERALLY SPEAKING, the engineer, in designing any machine, will provide grease lubrication if at all possible. In fact, most applications use grease as the lubricant. However, there are certain definite reasons why grease is unsuitable under particular conditions of operation, and a few of these examples are as follows:

1. For higher speeds where the heat dissipating qualities of the grease are not sufficient.
2. For very low temperatures where grease would be too stiff, and would offer too much resistance to the turning of the shaft.
3. For high operating temperatures where grease would melt.

Oil in itself is really the best scheme of lubrication for ball bearings. However, the difficulty in preventing oil from leaking out of its housing is the reason why many machines are provided with grease lubrication.

Oil lubrication depends on either circulating oil in a very small volume, or a splash system where the bearing is not in the oil at all but runs in a mist created by some sort of slinger. The vapor churned up in service follows the air currents and so escapes to a certain degree no matter how complicated the seal is. This constant leakage requires that the oil level be frequently checked and an oil level gauge simplifies this inspection.

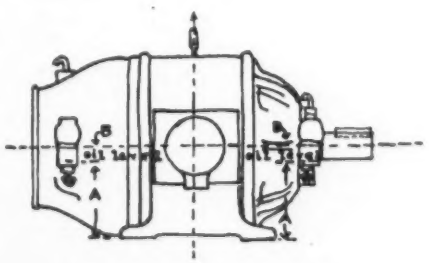
The fact that a seal for grease lubrication is not as effective as one for oil lubrication indicates that the maintenance man should never attempt to use oil in a bearing housing made for grease. Conversely, the size of the oil housing and method of getting the oil to the bearing does not make it possible to interchange grease for oil. There are exceptions to both of these conditions, but generally, a given housing *cannot* be alternately used for either oil or grease.

For the higher speeds where oil lubrication is most prevalent, the oil level must be carefully watched. The maximum height should not exceed the center of the lowest ball in the bearing, and the minimum height should be slightly above the top edge of the outer race. (See Fig. 3.)

Inspection should be made for bent pipes causing improper oil levels. With the oil filler cup, level gauge, or automatic oil level reservoir installed at the end of a pipe nipple several inches away from the center line of the shaft, care should be exercised to insure level installation of this extension. An excess or deficiency in the oil supply may be caused by a bent pipe. Too much oil like too much grease will produce a rise in temperature as a result of churning.

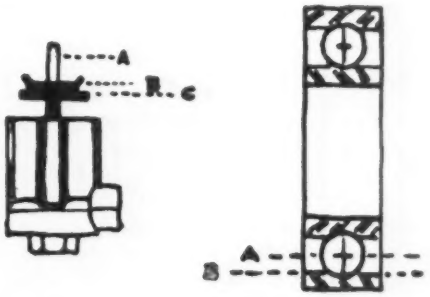
When metering holes are provided to limit the amount of oil getting into the bearing housing from the oil reservoir, care must be exercised in reassembling a motor to be sure that nothing is blocking this passage. Similarly, wick feed systems should be carefully assembled to assure continuous flow of oil.

The underlying theory of lubrication is that rubbing surfaces in a bearing shall be separated by a continuous film of oil. This requires that the lubricant have sufficient body to maintain the film under the pressure at the temperature of operation; it also requires that the lubricant be sufficiently fluid to flow into the small space between the rubbing surfaces.



FRAME	SPEED	A	B
364-365	3600-1800	7 9/16"	1 7/16"
404-405	3600-1800	8 7/16"	1 9/16"
444-445	3600-1800	9 1/8"	1 7/8"
504-505	3600-1800	10 5/8"	1 7/8"
6325-6328	3600-1800	12 1/4"	2 1/4"
6329	3600	13 1/4"	2 1/4"
6333-6338	1800	14 5/8"	2 3/8"
6339	3600	16 1/8"	2 3/8"
6339	1800	16 1/8"	2 3/8"
560	1800-1200	18 1/8"	2 7/8"

Where bearings are not accessible, as in totally enclosed motors, figures in above table refer to levels in drawing on G.E. motors. A is distance from feet up; B from center line of the shaft down to oil level



At left, a typical visual reservoir automatic level control oiler. To adjust level, the two wing sections B and C are run up or down on threads until top of upturned B is at proper oil level. C then serves as a jam-nut to lock both parts as set. If there are insufficient threads on A, the pipe nipple riser to the bottom of the oiler may be changed to suit. At right, Fig. 3, shows the maximum oil level at A, and minimum level at B

Assuming satisfactory characteristics in other respects, the one factor, determining the suitability of an oil for a given use to a greater extent than any other, is its viscosity. The viscosity is a measure of the body of an oil and an indication of its internal friction. Viscosity varies inversely with temperature, hence tests are frequently made at room temperature (frequently at 100° F.) The lower the viscosity, the less the internal friction and the more readily will the oil flow into the small space between rubbing surfaces in the bearing and establish the film, but the more readily will the film be broken, and permit the increased friction of metal rubbing against metal. Conversely, too high viscosity increases internal oil friction and raises the running temperature of the bearing; if viscosity is too great the oil may not flow into the bearing interstices and the film will not be established.

Different oils having viscosities respectively from about 85 seconds at 100° F. (Saybolt Universal Viscosimeter) to over 200 seconds at 100° F. have been used successfully and no reasons have developed to give preference to one oil over the others on the basis of viscosity notwithstanding the large range. Viscosities in the

lower half of the range or say from 90 to 150 seconds at 100° F. would be expected to prove more acceptable than those in the upper half. This range covers S.A.E. 10 and 20 turbine oils. Use of either of these weights is most logically determined by the location of the motor and whether it is outside or inside.

Bearings are designed for lubrication with mineral or petroleum oils and these only should be used. Straight run oils are to be preferred to those whose viscosity and other characteristics are obtained by the mixing or blending of two or more oils of widely different constants. Whatever oils are used, bearings must be inspected periodically to see that the oil wells are clean and that no sediment remains. Replace worn out oil with new. Kerosene, not gasoline, should be used for cleaning.

It has come to our attention that some maintenance men have been using automobile engine oil purchased from the nearest gas station for electric apparatus. This should be discouraged for the following reasons:

1. These oils are designed to have a suitable viscosity at engine temperatures and there is a wide difference in the viscosities at motor-bearing temperatures. For instance, S.A.E. 20 from different oil companies may vary all the way from 350 to 550 at motor temperatures, although they have practically the same viscosity at engine temperatures.

2. These oils are designed for a comparatively short life, and it is doubtful if the majority of drivers actually get more than 60 to 80 hours of full load on any batch of oil.

3. Many of the oils now contain detergents for the purpose of dispersing sludge, dissolving varnish, etc. These may tend to cause foaming in motor bearings.

4. These oils are not designed to have sufficiently long life for use in the motor bearings.

New Light Book

Putting into one book 30 years of continuous research in condensed form, *Light, Vision and Seeing*, a new 23-page book by Matthew Luckiesh, D.Sc., D. E., has been published by D. Van Nostrand Co., Inc., New York City. With 24 books to his credit, Luckiesh has coordinated and simplified the complex subjects of light, brightness, vision and human seeing and reduced data to simple diagrams. The final chapter lists and answers 100 questions most frequently asked about eyesight and vision. As director of the General Electric Lamp Department's Lighting Research Laboratory at Nela Park, Cleveland, Luckiesh both himself and in collaboration with other researchers at the laboratory has published the results of their investigations into lighting and seeing. These make up an extensive library. The present book is said to condense and coordinate the usable information from these various books into a single compact volume.

Graded Lighting

Declaring that "foot-candles" is too technical a term to be understood by the average person, the Lamp Division of Westinghouse Electric & Mfg. Co., of Bloomfield, N. J., in a handsome brochure, titled *Your No. 1 Load Building Opportunity*, proposes a system of grading lighting instead.

The grade A lighting would be from 70 to 150 foot-candles and would be recommended for exacting and severe eye tasks over a long period of time, such as fine needlework, inspection and other close eye work. Grade B, from 30 to 70 f-c, would be for prolonged critical seeing tasks, such as sewing on light goods, studying, working at a sewing machine and prolonged reading of small print. Grade C, from 15 to 30 f-c, would be for moderately critical seeing tasks, such as ordinary reading of large print, ordinary sewing on light goods, card playing, working in the kitchen, laundry or workbench, local lighting at the bed or dresser. Grade D, from 7 to 15 f-c, would be for general illumination where no discrimination of detail is involved, such as general lighting of the living room, a kitchen foyer, etc. Grade E would be illumination under 7 f-c and inadequate for most seeing tasks.

To carry forth this idea, its illuminating engineering department has developed a new graded light meter which, instead of carrying a calibration in foot-candles, has a scale marked off in the various grades. On the back of the meter is a description of what the various grades represent.

Object of the brochure is to demonstrate that lighting has been and will continue to be the No. 1 loadbuilding opportunity for utilities. It points out that material for building lighting load is ready, that industrial standards are up, that demand for better home lighting has been created, that new uses for lighting are planned and that better lighting has public acceptance. The surprisingly large figure of $1,500,000,000 as a lighting market, of which 65% is current, 28% lighting equipment and 12% lamps, is set up as a national potential. Numerous charts follow showing what may happen to the lighting load when the war ends and projecting the market potential into the future. Presuming the war to end in Europe in 1944 and in the Pacific in 1945, the projection is made to 1948.

It offers ideas, information, a clearinghouse, and sales training to aid the utilities in their illuminating engineering departments, proposes the graded lighting idea, and ends with illustrations of various new applications of lighting using the tools for illumination developed during the past few years.

Army Training

If proof were needed, there is aplenty to show that the United States Army is a well trained one technically. Such training begins in preinduction training courses offered potential inductees at a great many established schools throughout the country.

For the territory covered by the Ninth Service Command, comprising eight Western states, some 508,668 students were taking preinduction training courses of this kind in August of this year. In addition, some 13,000 preinduction training bulletins, 9,000 leaflets containing 62 questions and answers on the Army specialized training reserve program and 12,000 preinduction training informational bulletins were distributed to schools, selective service boards, service clubs, corporations and to a few individuals, according to Porter Hendricks, captain, Corps of Engineers, who is chief of the Preinduction Training Branch of the Army Specialized Training Division for the Ninth Service Command.

To make sure that these training courses cover the necessary fundamentals and detail, the War Department has issued specific training course booklets. Those pertaining to electricity are numbered PIT-101 *Fundamentals of Electricity-A Basic Course* and PIT-334 *Electrical Signal Communication.* Large numbers of the Westinghouse booklet *A Course in the Fundamentals of Electricity* were also distributed and for the guidance of the educational institutions a *Bibliography of Visual Aids for Preinduction Training.*

Since interest now centers in the question of how much training men in the armed services have received in electricity and how well fitted they will be to handle electrical work upon their return to civilian life, this knowledge of the training given is of value. After induction training courses are given to men in specialized branches, often requiring electrical or mechanical knowledge. Field practice extends this education.

Light to Live With

Ketch outlines 3A and 1-3-5 lighting plans

J. M. Ketch, illuminating engineer for General Electric Co. at Nela Park Engineering Division, Cleveland, conducted a series of meetings for the industry and for architects in Denver, Salt Lake City and Los Angeles, bringing such audiences the latest thinking as to applications of "light to architecture."

We have passed through the first two stages of the lighting program, "Light to See By" and are in the third, "Light to Live With", he stated. Progress in lighting seemed to have reached its limit eight years ago when incandescent had attained its heat limit and fluorescent hadn't been developed, he pointed out, but study of the cosmic spectrum beyond the visible has brought many new light sources; footcandles of light have been increased from 20 during World War I to 10,000 in World War II. Production on a 24-hour basis has been made possible during this war due to increased lighting efficiency, he stated, and one of the newest uses of light in war plants is that of speeding the drying of painted surfaces by radiant heat.

Telling of the development of germicidal lamps, he declared that, as a result of present tests of these units, it is quite probable that, in the near future, businessmen will be able to advertise that their stores are germ free. He warned, however, that the industry should be extremely careful in making this type of installation; otherwise it might be harmful to human beings.

Show window lighting can help stop the 80% who pass a window in three seconds, he brought out. Each window should have only one idea, he maintained, and it should be silhouetted through contrast, being either light against a dark background or dark against a light ground; it should have high brightness with a punch light from the upper left hand corner, lining light into the window; and it should have color. New ideas in store fronts include many of a visual type, permitting the public to see into the store from the street. This type is adaptable to many businesses, Ketch believes, but for a few, such as women's apparel stores, is not practical.

Outlining his "3-A" lighting plan—atmosphere, appraisal, attraction—, he declared that each is highly important. Location and type of merchandise sold determine the atmosphere of a store; ability to see the texture and quality of articles cuts down the number of returns; attraction lighting can make people go where you want them to go, he pointed out.

Ketch described one-three-five store lighting, in which the showcase light is three times and the special niche and advertising lighting is five times the intensity of the general lighting. With this plan, expenditures for illumination should go one-half to general lighting and one-half to the "three" and "five" lighting, he stated. One of the best arguments for the value of store lighting was the reaction when light was curtailed, he declared, and practically every merchant lists improved lighting as a major item in any modernization program.

Certified Lamp

Certified portable lamps will again be on the market when the War Production Board restrictions on materials used in the manufacture of such lamps are removed, the advisory board of the IES Better Sight manufacturers decided recently. Although the Illuminating Engineering Society at its recent convention decided against the use of this name in the certification of lamps, plans are being made for a certification plan along the same lines for lamps which meet certain standards of performance which the Illuminating Engineering Society will designate. New uses of metal, glass and plastics and new application of light sources are expected to increase the variety of types of lamps which can meet the standards of performance as set forth by the IES.

The organization of the Better Sight manufacturers through Foster & Davies, its advertising counsel, announces that Electrical Testing Laboratories, Inc., of New York will continue as the testing and certifying authority. The certification plan will extend beyond the so-called scientific or sightsaving lamp to include almost every kind of portable. Some lamps are designed not for reading or sewing or bridge but for less critical seeing tasks or merely to provide decoration. Differences in certification will be set up. However, even such lamps require standards of mechanical excellence and electrical safety. Before the war some 60 portable lamp and shade manufacturers participated in the IES better sight lamp program. The organization has an advisory board and a definite program of action which should develop the market for postwar portable lamp sales on a basis of quality merchandise and scientific lighting design, with a certification to the public that the standards are adequate.

F-Lamp Trend

WPB committeeman Hobbs explains late WPB changes

Speaking before the EMEA and IES joint meeting in Los Angeles recently, Leonard Hobbs, assistant general manager of Smoot-Holman Co. reported on the materials situation affecting the lighting fixture industry as he found it while attending the recent joint Fluorescent and Incandescent Lighting Fixture Advisory Committee meeting in Washington.

The copper situation was still critical, according to Hobbs, and the industry was faced with a dwindling stock pile. Cutbacks can be expected for users of copper or copper base products except for urgent war needs.

Aluminum, he said, was plentiful and applications for allotment of this material were being granted for all essential needs. However, alzac sheets used in the manufacture of lighting reflectors were still scarce.

Limitations applying to the Incandescent Lighting Fixture Order L-212 have been gradually relaxed, and it was his opinion that little if any critical material would be consumed if the order were revoked. Lack of manpower and shortage of cartons will prevent any great production step-up.

The situation surrounding the manufacture of fluorescent lighting equipment still remains critical, according to Hobbs. The machines and manpower for producing ballasts are the same as those used in the manufacture of coils for radio and radar equipment. This latter program is of such magnitude that little or no increase can be expected in ballasts for the next several months, he said.

The deplorable black market in fluorescent lighting fixtures was described by Hobbs, who criticized those few members of the industry who would divert material needed in the war effort to produce prohibited items for personal gain. He assured the members that WPB compliance was alert to the conditions and reported that Washington authorities had told him that cases were being handled as rapidly as possible, although it might require as long as eighteen months or two years to bring some of the violators to justice, due to the crowded court dockets.

Hobbs, in addition to serving as a member of the WPB Incandescent Lighting Fixture Advisory Committee, is a member of the Fleur-O-Lier Advisory Board and a member of the Underwriters' Code committee of the Lighting Fixture Section NEMA.

B. C. Dealers Express Frank Opinions

Anticipating return of merchandise, they give trade hazards a workover, recommending changes which Western dealers in U. S. will approve

APPROXIMATELY 100 dealers from points throughout the province assembled at the Hotel Vancouver Oct. 23 for the first convention of the Electrical Appliance Dealers Assn. of British Columbia. Sponsored by the Retail Merchants Assn., the conclave was part of its program to enlist provincial groups in the RMA national electrical appliance division.

Arrangements were handled jointly by George R. Matthews, B. C. secretary of the merchants association, and R. Hall, secretary-manager of the Electrical Service League of British Columbia, with leaders in the electrical merchandising field cooperating.

Langtry Bell, for many years chairman of the Vancouver Electrical Appliance Dealers Assn. and general chairman for the convention, was elected B. C. representative on the national RMA executive.

Open forum discussions, with Howard Walters as chairman, brought forth lively debates both morning and afternoon. Fred R. Cavers, president of the Ontario Electrical Appliance Dealers Assn., was the luncheon speaker and, with Wilfred Hodgins, member of the Ontario association's executive, and A. G. Frame, RMA executive Dominion secretary, participated in the discussion. Harold Brown, president of the B. C. Federation of Trade & Industry, spoke on rehabilitation problems at the convention dinner, attended by more than 250 persons.

Ceiling Prices

Serious consideration was given present ceiling prices on used appliances. When the flow of goods resumes, dealers will not welcome used merchandise unless on a reasonably low-price basis, it was pointed out, and downward revision of prices to compare with the basic period rather than the original ceiling was favored.

The convention also went on record as favoring immediate enforcement of regulations establishing for private consumers making sales, and for auctioneers acting as consumer agents, a ceiling price on the same level as that allowed dealers on guaranteed sales. It was felt that the owner should be required to possess goods for six months previous to such private sale.

Publication of a blue book of trade-in values on used appliances and radios was suggested as an aid to dealers, particularly in the postwar period, although it was stressed that it must be regional to be of value.

New Models

Contending that in the past many of the so-called "new" models incorporated only minor changes and that this tended to confuse the public and disrupt the market, a group of dealers proposed a resolution asking appliance and radio manufacturers to bring out new models only as new engineering designs warrant. Some, however, brought out that annual model changes stimulated sales, particularly in radios, and others objected on the grounds that curtailment would place Canadian trade at a disadvantage, encouraging import of electrical appliances from the United States.

The real problem, it was declared, was not that of curtailment but of forcing manufacturers to provide an improved method of disposing of existing models when new ones were introduced. In a closely divided vote, the majority favored changes in radio models annually, in other electrical appliances only as engineering improvements might justify.

Consensus was that the 90-day guarantee on radio tubes should date from the time of sale by the retailer, a procedure said to be more satisfactory to dealers than the discount system now used by some manufacturers. A standard price and a uniform discount system on all tubes also was recommended.

Discounts

A plea for standardization of discounts regardless of quantity purchased was opposed on the grounds that it cost the larger dealer more money to conduct his business. A suggestion that a greater list of discounts be published on the basis of quantity purchases brought the warning that such a system would start a vicious circle, encouraging over-buying and finally over-anxiety to sell, with inevitable price cutting. All agreed finally on a recommendation that the grade system of A, B and C discounts be introduced by all manufacturers. It was suggested to manufacturers that, in granting either franchises postwar, a clause be inserted compelling acceptance by the retailer of a code of fair trade practices attached to the franchise, and that it be clearly understood that violation of the code would result in cancellation of the franchise. It was felt that such action would prevent return of the chaotic prewar merchandising conditions.

Marked opposition to the practice of allowing building contractors to buy direct from manufacturers and wholesalers was expressed by the dealers. Recognizing that jobbers with large builder accounts would find it awkward to refuse to sell them electric appliances, the convention suggested that manufacturers accept responsibility, issuing definite instructions to their jobbers against direct sales to building contractors. Proposal by the Ontario association that all sales to building contractors be made through the retail trade and that a 10% discount be allowed on three to six stoves or refrigerators and 15% for seven or more units delivered to one address was endorsed by the B. C. group, as was the Manitoba suggestion for a clause permitting 10% discount to be made by retailers on single sales of stoves. ranges and refrigerators to electrical contractors not operating their own appliance stores. The B. C. dealers proposed that a clause embodying these suggestions be included in the dealer franchise agreement already discussed, and that larger discounts or secret rebates be regarded by manufacturers as violations.

Credit Terms

In a prolonged discussion of credit terms postwar, it developed that all dealers present were in favor of continued regulation, the point at issue being government control. Whereas a formal motion favoring extension of present regulations postwar was opposed by many as tantamount to asking for continuation of government control, an alternative proposal for voluntary control was unacceptable to others, who declared that such systems had failed in the past. It was pointed out, however, that prior to passage of the Dominion War Measures Act, the trade in B.C. had set its own credit terms and these had been adhered to reasonably well.

Final decision was for consideration of the matter, if and when government controls were removed, by the

executive of the national association. In general, it was believed that the minimum down payment postwar should be 25%, exclusive of the trade-in value; that purchasers be allowed 12 months to pay for appliances costing under $150, 18 months on appliances over $150.

Reduction in dealer margins, advocated by some manufacturers as a means of building sales volume, was strongly opposed by the B. C. dealers, who joined the Ontario group in asking manufacturers for a discussion of this subject. To eliminate discrepancies between manufacturers and dealers guarantees and warrantees on different parts of radios and appliances, the meeting recommended a straight 90-day guarantee for the complete radio and a one-year guarantee on all electrical appliances, with no extra guarantee on any part.

Another recommendation sent to the manufacturers covered a dealer franchise clause requiring dealers to maintain their own service departments or to have a contract with an established service organization.

Excise Tax

Immediate demand to the government for removal of the excise tax on electrical appliances was favored, despite the argument that the tax, if allowed to remain for the present, would serve as a cushion to absorb the shock of increased prices when appliances are manufactured again. In asking for removal of the tax, the dealers emphasized that such action when dealer stocks are either out or very low, would prevent dealers from being penalized in the purchase of new stocks when available.

Direct manufacturer-wholesaler-to-consumer sales prompted a heated discussion, during which the dealers were unanimous in protesting the rescinding of Order 120 prohibiting such sales. In this connection, it was suggested also that legislation be secured prohibiting wholesalers from operating retail shipments on the same premises as the wholesale warehouses, since the situation in British Columbia in the electrical appliance, furniture and hardware fields was declared serious.

Offering of premiums to dealers by manufacturers was criticized and elimination of such practice was asked.

Although vigorously opposed to placing any handicap on returning service men, the B. C. dealers declared themselves against the opening of new outlets for sales and servicing of electrical appliances so long as parts and merchandise remained scarce. It was pointed out that, in the past few months, a number of new appliance dealers had been established in Canada and were making the parts situation more difficult for firms which had continued to serve the public during the critical period.

Referred to both the provincial and national executives was the importation into the East Kootenay and Vancouver districts of enormous quantities of electrical appliances from Spokane.

Attacking the problem of taxation differential between new business and established business, the dealers emphasized that efforts should be made to secure some relief in this regard for existing business to permit the building of working capital.

Indiscriminate granting of the hydroelectric seal of approval was condemned, it being stated that inferior merchandise had been palmed off as "just as good" as high-class products on the grounds that both bore the seal.

A resolution asking manufacturers to establish a factory outlet in each province instead of working through jobbers was opposed as unfair to existing jobbers.

While the dealers recognized that some action had been taken under rehabilitation plans, toward training men in the electric appliance service field, they voted to send a resolution to Ottawa urging fuller recognition of this field.

Criticism was aimed at the quality of merchandise issued by some manufacturers in the past and consensus was to ask the national association to urge more rigid standards when production is resumed.

● To RECORD today's trends as an aid to postwar planning, Puget Sound Power & Light Co. is publishing a monthly digest of current events affecting electrical dealers. Entitled *Today's News for Tomorrow's Sales*, the mimeographed bulletin tells of WPB and OPA rulings, surveys, new developments and markets, etc.

Dividend

Farm use contest pays users and company

To stimulate thinking on farm uses of electricity and, at the same time, secure material upon which to base future advertising, Utah Power & Light and the Western Colorado Power companies recently conducted a letter contest among rural customers. According to W. A. Huckins, Utah Power & Light sales manager, 250 entries were received and $1,625 in War Bonds were awarded the 24 winners.

All customers engaged in farming and gardening were invited to submit letters telling *How My Family is Using Electricity to Produce Food for Victory*. Individual prizes ranged from $50 to $150 in bonds.

The contest was promoted by newspaper, direct mail, radio spots, display and some personal contact. Advertising stressed the point that "fancy" letters were not desired; that contestants should tell *what* electric equipment is being used, both on the farm and in the home, and *how* it is being used. Length was not prescribed.

Prizes were awarded at special programs, Utah winners receiving theirs from George M. Gadsby, utility president, at the state fair in Salt Lake City. Winners were guests of the utility at the fair. In Idaho Falls and Preston, Idaho, award dinners were staged, with persons prominent in farm activities present, and the bonds were given out by Huckins. J. A. Bullock, general manager, D. L. Holt, sales manager, and Hazel Comstock, home service director, made the awards in Western Colorado Power territory.

At Idaho Falls the War Bond prizes were given winning contestants by W. A. Huckins, general sales manager (center). Contest brought many usable ad ideas

Be Kind to Supply Sources—It Pays

Pueblo dealer better supplied in time of scarcity because he was considerate of jobbers when times were bad and he could have ridden herd on them; they remember him and do their best to help him now

James Clyde Porter

THERE has been a lot of talk about electrical merchandise being scarce ever since the war started. And it isn't all talk, either, because the stuff *is* scarce. Yet right in the midst of the scarcest time of all, the Rheuff Electric Co. of Pueblo, Colo., owned by Howard V. Rheuff, is getting pretty much whatever it wants. Thereby hangs a real business story of a man who was wise before he had to be and who is now reaping the full benefits of that wise policy.

The Rheuff Electric Co. was started 14 years ago, just about the toughest time in the history of this country to start anything. Business was bad in the Pueblo area at that time as it was elsewhere in this country. Electrical dealers were very much the boss those days when they bought from their jobber or manufacturer. Business was so scarce and hard to get that a jobber or manufacturer would take almost anything from a retailer who had even a little business to offer.

But Rheuff isn't that sort of a man. He believes in living and letting live at the same time. More than that, he doesn't believe in kicking unless a thing gets really bad. So from the very start of the Rheuff Electric Co., its proprietor made it a hard and fast rule not to be too fussy with the jobbers and manufacturers from whom he purchased. It was a new experience in the life of many a jobber and manufacturer serving the Pueblo area. Naturally the boys from whom Rheuff bought in those tough times more than appreciated the business and treated him royally. But the real payoff is coming now.

In present wartime days, it is the jobber and the manufacturer who can be fussy. But not so with Rheuff. They all remember how he acted when he had the chance to be "funny" if he wanted to, so they are all treating him royally now. Two little incidents tell how.

Not long ago Rheuff needed some plugs. He would have been tickled pink if he could have found twenty-five. He called up a jobber with whom he does business and with whom he did business from the start. The jobber checked his stock while Rheuff was on the long distance telephone and informed him that there were

Howard Rheuff, Pueblo, Colo. dealer

exactly 100 plugs in stock. Without waiting for a word from Rheuff as to how many of the plugs he would like to have, the jobber told him that he would send him 75 plugs. In short the jobber turned over to Rheuff exactly 75% of his plug stock—just because he had been a good fellow when good fellows were scarce and hard to find.

Still another incident. A customer in Pueblo needed some large floodlights. Here was a scarce item. The customer who wanted them had shopped around pretty much all over the Pueblo area, even calling up out-of-town places without avail. Finally the Rheuff Electric Co. was called upon. Rheuff plainly told the customer that he didn't have a single one in stock but that he thought he could get some. The customer laughed but not so Rheuff. He phoned long distance, to another jobber and told him what he needed. Within 36 hours the floodlights were in Pueblo. A jobber had them and was more than happy to turn them loose to the man who had acted so fine when he didn't have to back in the depression days.

But there is more to this than simply getting the supplies when he needs them. Rheuff is getting business, too, because he can get delivery of the necessary material needed for jobs. He already had a good slice of the business from the Pueblo Army Air Base but recently had this business upped 20% because he could offer quicker deliveries than others in the Pueblo area. And all of this because he didn't kick back in the depression days when so many electrical dealers were doing so all the time.

From the start of the war, it has been the custom of Rheuff Electric Co. to accept war jobs whenever offered and whenever the acceptance of such jobs didn't interfere with service offered to the firm's regular customers. That is not to say that the war effort was passed up but that Rheuff believed from the start that the firm that forgets completely its customers will live to see the day when the firm hasn't any customers.

As a result of this policy, the Rheuff Electric Co. has been able not only to take care of considerable war business but has been able to hold its customers, and they know that even in the midst of a war they are not forgotten. It is a safe bet that when the war is over and there is no great competition for supplies, the customers of this firm will remember how they were served back in the war days when there was a great temptation for any electrical dealer to neglect them for war and wartime profits.

Today the Rheuff Electric Co., in the face of the toughest times that business has ever faced in this country, is doing a bigger business than it has ever done. Repair material is hard to get, yet the firm is getting some and so is able to maintain its repair and service department. Electrical merchandise is scarce, yet this firm is getting enough to keep up a most satisfactory sales volume.

When the Rheuff Electric Co. was started back in the depression days, there were exactly 13 electric companies in Pueblo. Today there are just six. Not only has this firm weathered the storm but it has consistently grown bigger and bigger while others have remained about the same—or gone out of business. It certainly looks as if it pays to be a good fellow, even when you do not have to be one.

And all of this was done according to strict business Hoyle. In no instance has Rheuff dealt with black market operators. In no instance has he given a bribe in order to get the things that he needed. In no instance has anything been done that was not in strict accordance with the strictest business ethics.

On items where there is government control and priorities are needed, Rheuff has been able to get only what regulations allow him. But on many other items, where there are no restrictions except those imposed by the manufacturers and jobbers, but which are scarce because of the tremendous demand for them, Rheuff has been favored with a goodly supply—just because manufacturers and jobbers remembered that he was a good fellow when times were tough.

All the business world likes the fellow who goes around in depression time with a smile on his face and an order in his hand, even if it is only a little order. That is the secret of Rheuff's success and it might well be the secret of other dealers.

Wholesale Survey

A national survey of the electric appliance distributing industry will be made by the Appliance Division of the National Electrical Wholesalers Assn., it was reported last month by Charles G. Pyle, managing director of the association.

Purpose is to determine chief problems now in the servicing, repairing and guaranteeing of electrical appliances and factors likely to be most troublesome immediately after the war. A questionnaire covering these points will be sent to the Appliance Division membership of the association and to unaffiliated distributors.

● HOUSING is the subject of the second in Pacific Gas and Electric Co.'s series of postwar market studies, being prepared by its planning committee for use of electric and gas appliance dealers in northern and central California. Designed for use in conjunction with the initial study on population, the bulletin includes factual data on housing facilities built during the war, details regarding the expected eradication of temporary housing and forecasts of requirements for the first five postwar years. The third study on *Purchasing Power* was due Dec. 1.

● REFRIGERATION service training courses have been reopened in Utah, with classes at the University of Utah and in high schools at Salt Lake, Logan, Ogden, Provo and Price. More than 150 were enrolled in the previous course, sponsored by the National Refrigeration Manpower Committee and the Electrical League of Utah. All dealers and jobbers are invited to enroll men in these classes which are arranged by J. F. McAllister, field coordinator for the NRMC. All costs are borne by the vocational schools.

New Homes

Rice makes Western survey of potential for EEI

In line with other studies being made, and projections drawn from them, as to what may be expected in the way of market possibilities when the war is over, H. C. Rice, merchandise manager, Southern California Edison Co., Ltd., has gathered together data about home building from most of the western utilities, privately owned and municipal, as chairman of the residential survey committee of Edison Electric Institute.

The accompanying table lists the prognostications made by the commercial or sales executives of the utilities named and their estimates of residential building that may be expected in territories served by municipal utilities or REA's adjacent to them. The estimates are made by years, for each of five years after the end of the war.

Rice comments that it is significant that more than 250,000 of the total of 439,462 are predicted for southern California, 109,000 in northern California and the balance throughout the West.

Edison has just completed a recheck of the number of dealers in its territory, Rice adds. The total is 774 in 32 cities and towns served by the company. These do not include dealers in the large municipally served cities of Los Angeles, Pasadena, Glendale, Burbank, Anaheim and Riverside.

Numbers of dealers of each type are: electrical dealers 150, electrical contractor-dealers 98, wiring contractors 121, hardware 108, furniture 46, general merchandise 46, tire company 52, radio dealers 51, miscellaneous 50.

Home planning institutes are beginning the fall term in large numbers. "We are being overwhelmed with requests for home planning institutes," Rice writes. "The first one started Sept. 25 in Inglewood, followed by Santa Monica Sept. 26, Riverside Oct. 4, San Bernardino Oct. 11, and to follow are Ontario, Long Beach, El Monte, Montebello, Norwalk, Redlands, Compton, South Pasadena and Santa Barbara (a repeater) as fast as dates can be assigned."

● A WAR PRODUCT DISPLAY, made up of hundreds of products manufactured by 23 Spokane and vicinity manufacturers, was put on at the Spokans County Fair recently under the sponsorship of the construction and industry committee of the Spokane Chamber of Commerce, of which Ladner V. Ross, manager, commercial and industrial sales, the Washington Water Power Co., was chairman. Purpose of the display was to show the public the variety of war products being manufactured in that community and, likewise, to acquaint them with the names of local manufacturers in order that their peacetime products might be recognized and patronized when reconversion comes.

ESTIMATED POSTWAR NEW RESIDENTIAL CONSTRUCTION

	1st Year	2nd Year	3rd Year	4th Year	5th Year	Total
Indian Valley Light & Power Co.	25	25	15	15	15	95
Tucson Gas & Electric L. & Pwr. Co.	125	125	125	125	125	625
Utah Power & Light Co.	1,000	1,400	1,800	1,900	1,900	8,000
Municipal utilities	250	350	400	500	500	2,000
Mountain States Power Co.	600	300	300	400	400	2,000
Municipal utilities	250	50	50	100	100	550
Uintah Power & Light Co.	100	100	50	50	50	350
REA	25	25	25	25	25	125
Northwestern Elec. Co.	550	950	1,200	*	*	2,700
California Elec. Power Co.	1,300	1,900	2,650	2,650	2,650	11,150
Municipal utilities	450	600	850	850	850	3,600
Pacific Gas & Elec. Co.	22,690	22,810	26,953	19,185	17,798	109,436
Eastern Oregon Light & Power Co.	115	150	150	125	125	665
Portland Gen'l Elec. Co.	2,000	2,500	2,500	3,000	3,000	13,000
Pacific Power & Lt. Co.	1,000	2,500	3,000	3,000	2,500	12,000
The Wash. Water Power Co.	600	700	800	800	600	3,500
Orcas Power & Light Co. REA utility	18	12	12	12	12	66
San Diego Gas & Elec. Co.	3,200	4,700	4,700	3,800	3,200	19,600
Southern California Edison Co.	25,000	25,000	25,000	25,000	25,000	125,000
Municipal utilities	25,000	25,000	25,000	25,000	25,000	125,000
Private utilities	58,305	63,160	69,243	60,050	57,363	308,121
Municipal utilities	25,950	26,000	26,300	26,450	26,450	131,150
REA	43	37	37	37	37	191
GRAND TOTAL	84,298	89,197	95,580	86,537	83,850	439,462

* No estimate.

Fred Porter, Jack Fenton and Harry Foss, of West Coast staff of Landers, Frary & Clark, makers of Universal appliances, attended Universal regional salesmen's postwar conference at New Britain, Conn., plants, to bring back latest developments in "U Plan for V Day" which this manufacturer supplies to its dealers

● JOHN R. KALBERG has been appointed acting promotion manager of the Western Merchandise Mart at San Francisco, it was announced recently by Frank K. Runyan, Mart president. The position had been vacant since George A. L'Amoreaux left in October, 1943, to enter the Navy. Kalberg had been serving with the U. S. Marines and was at one time San Francisco regional chief of service operations for the Office of Emergency Management. He also has served as deputy regional manager of the Home Owner's Loan Corp., San Francisco.

● GEORGE PIZARRO, for 25 years in the electric appliance business, has taken a position as sales manager of Adel Precision Products Corp., Burbank, Calif., consumer products division. The company has offices in Seattle and at several points in the east and plans an immediate expansion program. Vacuum cleaners, electric mixers, garbage disposers and other products will be marketed through wholesale distributors when production of civilian goods is resumed, according to recent announcement of Ray Ellinwood, president of the company.

● PRICES which can be charged under OPA ceilings are as limiting a factor on the production of new washing machines as the labor shortage. An authorization of 57,000 machines per quarter would not be high enough to develop economies of mass production necessary to meet OPA ceilings without serious financial loss, the American Washer and Ironer Manufacturer's Assn. declares.

● YOUNGSTOWN Kitchens by Mullins is the trade name to be used by Mullins Mfg. Corp. for its postwar line of steel kitchen sinks and cabinets. The equipment previously was known as Youngstown Pressed Steel Kitchens or YPS Kitchens.

Pictured here at its preview for the press during last market week, Lois Ferris, Pacific Coast district home economist for Westinghouse Electric & Mfg. Co., has been giving similar demonstrations of postwar Laundromat at dept. stores in various cities, also handling appliances classes at home planning institutes

Block Busters

As a means of supplying dealers with ideas as to the future of the electrical appliance business, the Portland General Electric Co. has recently sent to all dealers in its territory an unusual booklet in the shape of a bomb which carries the title *Block Busters for Victory*. It presents attractively to dealers a reminder of the family of electric appliances, which it calls the "Royal Family." But it emphasizes that, in preparation for their return, certain things have to be done.

Among these are keeping prices down, making jobs wherever possible, making the cycle of distribution work smoothly. Then it reviews the possible future in various appliances, including home food lockers, small appliances, radio, house heating, air conditioning, refrigerators, complete electric kitchens, electric ranges, electric water heaters, the combination of the two, home lighting, home laundry equipment, farm electrical equipment, store lighting, service and repairs. It promises low rates and a "better Bonneville bargain" in that with its rates it pays taxes which help the community. Finally it has a sage word on competition and cooperation and urges that dealers make their own postwar plans.

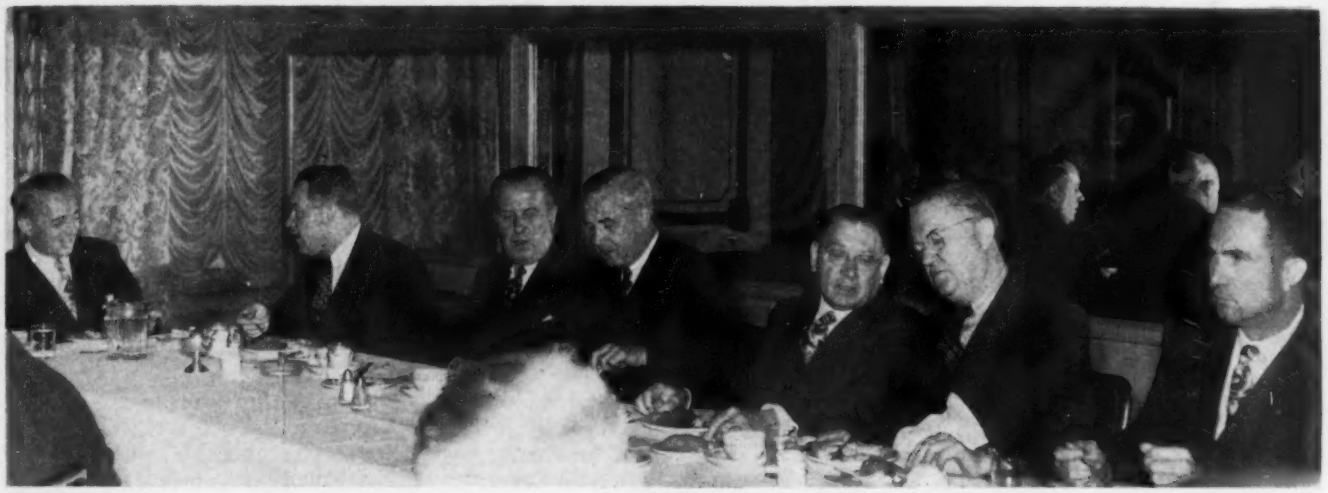
These booklets were sent out with a letter from James H. Polhemus, president of the company, saying, "It is our desire to say just enough, and not too much, about each electrical appliance to provide aid in planning your postwar program."

● STATING that initially, its line would be simplified for quantity production, Proctor Electric Co. recently announced its reconversion program. Following are some of the points emphasized in answer to dealer queries:

The company will specialize in automatic electric appliances and will limit its efforts to the "traffic appliance" field. Distribution will be confined to recognized wholesalers of electric appliances and the line will not be sold to retailers on a direct basis.

First wartime production will be limited to one model iron and one model toaster. The first Proctor iron will be a conventional heel-rest model of prewar design, 1,000 watts, light weight. When the Never-Lift iron is made, it will be on a mass production basis, with only one model.

After irons and toasters are rolling from assembly lines in peak quantity, other appliances, including an electric roaster and a waffle iron will go into production. Here, too, the simplification policy will prevail, with one model only produced.



Past Presidents Tenney, Angle, Glosser, Bauer, Alvord, Wishon. Rex Nicholson, luncheon speaker, on extreme right.

PCEA Girds Industry for the Future

HANCE CLELAND has a hobby. It is more than a hobby, it is a dedication, a cause, a crusade. With the simple power of complete sincerity, he has carried the Pacific Coast Electrical Assn. with him into this cause—the cause of G. I. Joe. As the time draws closer for the return of G. I. Joe, the program of the PCEA is veered toward that time when he can be taken back into the industry he left to go to war.

It was natural, then, that the two annual fall conferences of PCEA, held in San Francisco, Nov. 9, and Los Angeles, Nov. 17, be directed toward G. I. Joe and the means whereby jobs would be made for him upon his return. Since jobs do not drop like manna from heaven, but must be derived as a result of growth and expansion and new business, the practical PCEA explored the future outlook for its many businesses as a necessary prelude to the jobs it wishes to have ready for Joe. Each of the sections of the association, while concerning itself with immediate problems and trends, probed into the future to be ready for the adjustments that may be necessary when the war ends.

The luncheon speaker at each conference brought an outside viewpoint of the necessity to build the West in order to create the need for manpower, which is the only way by which jobs can be made for G. I. Joe and his brother warworker. To this cause Hance H. Cleland, president of PCEA, and president of San Diego Gas & Electric Co., asked both northern and southern conference groups to stand and pledge themselves in an impressive yet simple ceremony at the end of the luncheon meeting. (See accompanying box)

Build the West to Build the Nation was the theme of the San Francisco luncheon address by Rex Nicholson, executive director, Builders of the West, Inc. The West, said he, offers the only elbow room left in the nation for expansion. Only since the war has it really developed industrially. Electric power is the base for this development and can be for its continuance in converted form for peacetime industry. Instead of sending raw materials from the West to Eastern manufacturing centers, he maintained, such materials should be processed in this region. Among industries that should be developed, he said, are wool and textile processing and weaving, plastics, hardware, the steel, magnesium and aluminum fabricating industries which should utilize these newly developed raw materials industries of the West.

Twice in the past decade the nation, he said, had foreseen major crises approaching but done nothing to prepare for them. Now, foreseeing a re-employment crisis, he urged that preparation be made in advance to meet it. He enumerated a number of questions the business man asked himself before he wanted to plan—the tax structure, the labor situation, governmental attitude, extent of regulation and restriction—but threw down the challenge to surmount these deterrents and put full weight behind all programs such as CED and chambers of commerce and his own Builders of the West that aim to take care of this crisis by expanding business for all.

LeRoy M. Edwards, vice-president and general manager, Pacific Lighting Corp., covered the same topic in a different way at the Los Angeles conference luncheon. His talk, *The War and Postwar Problems of Southern California,* directed itself more to the war achievements in production of southern California and bristled with figures. As manpower director, he spoke

G.I. Joe is distinguishable by the uniform he wears.
His brother wears an identifying badge or button.
The Democrats won.
We are in a war.
We want to get it over with and live normal lives again.
I now propose that we dedicate ourselves to these principles.
Please stand and repeat after me—

We had an election last Tuesday
The American people have spoken
We accept their decision
Let's go back to work
And work like Hell
To win this war
And give G.I. Joe and his brother
A job
All to the end
That America may live
In peace and prosperity
Forever
Amen

Cleland Hartley

with authority of the manpower shortage problem still acute in that region. Then he sized the employment conversion problem when war ends, citing surveys among warworkers as to intentions to stay. He also told that 42% of women war workers said they intended to continue working.

After reviewing the many difficulties and hazards realistically and declaring that there could be no painless victory nor quick and easy peacetime conversion he advocated twelve things to do:

First, he said, California should insist that it start peacetime commodity manufacture at the same time the rest of the nation does; urge procurement agencies not to demand a disproportionate war production for this region after German victory; "let's ration government and make it scarce" by reducing federal costs; keep social security within bounds of what can be afforded; reduce taxes that destroy the initiative of business and thus permit expansions that will pay taxes to sustain the budget; produce wealth again and remove government controls on such production; use every influence to employ the abundant metals of the West into production; hold the aircraft industry in the region; develop Latin-American trade from the West; work in close harmony with labor; quit paralleling European experiments in government; and finally fight for elimination of price and profit controls which destroy initiative.

Edwards ended with a long needed protest on behalf of the forgotten stockholder, whom he said had been given only a K-ration of bare subsistence. Without fair return on investments, he said, capital to finance expansion would not be forthcoming.

Operating Economics

E. W. Morris, chairman,
Westinghouse Electric & Mfg. Co.
Los Angeles
C. E. Baugh, vice-chairman
Pacific Gas and Electric Co.
San Francisco

NOISE effect of bad wave form of fluorescent auxiliaries on communication circuits, design practice and operating experience of lines in low-revenue rural areas, trends in cable design and new developments in synthetic insulations and recent advances in transformer and turbine oils, were subjects highlighting meetings of the Operating Economics Section, both north and south.

Power and telephone engineers are concerned over possible increased noise level of power circuits caused by harmonics of present fluorescent auxilaries, when fluorescent lighting invades the home after the war. At the northern meeting, the subject was handled by W. R. Johnson, PG and E. and Stanley Rapp, P.T. & T. Co. In Los Angeles, Fred B. Doolittle, Southern California Edison Co., and M. A. Sawyer, Southern California Telephone Co., presented the problem. A demonstration with a cathode ray oscilloscope in conjunction with a loud speaker showed that single-lamp, power factor corrected ballasts are the worst offenders in producing harmonics that will cause inductive coordination problems, especially where joint pole construction is employed. Use of a "T" circuit, or filtered ballast was one of the solutions suggested should this problem reach serious proportions. This subject is covered at greater length on page 53 of this issue.

Discussion leaders on the subject of operating experiences on distribution lines in low-revenue areas, were R. R. Cowles, PG and E, north, and C. A. Rochholz, California Electric Power Corp., south. A number of reports by those who contributed to the discussion on operating experience with substandard lines showed that it is possible to design long-span, high-strength conductor, rural lines for low revenue areas that will give a good service record, and yet comply with modified orders of the California Railroad Commission. Several reported current studies being made by their companies that will effect design economies and lower construction costs for anticipated postwar activity in further rural electrification.

Trend in design and performance of cables in distribution and transmission circuits was reported by I. W. Borda, The Okonite Co. A colored motion picture was shown depicting the installation and splicing of a combination aerial messenger cable. Feature of the cable is that it has an inbuilt messenger of Copperweld steel which is used as the ground. Such cable is adaptable where the tree problem is severe and data presented showed installed cable costs to be not more than 12 to 20% greater than for tree wire. Borda gave an informative discussion of new developments in synthetic rubber and other new wire insulations, pointing out that several of these hold great promise, particularly Buna S with an oil base compound and one of the new thermoplastics called Polyethene. This latter comes from the suppliers in packages very much like cereal from the grocer and is easy of application to the conductor by the extrusion process. Its present cost is quite high, but suppliers indicate that after the war its costs will be very low, in fact considerably

Borda Poynter Hale Smith Balchin

lower that the cost of rubber or Neoprene, which together with all the things that it will do and the ease of application will make it a very popular and useful dielectric. It will admit of a copper operating temperature of between 75 and 90° C. Its only disadvantage at present is that it will burn, but it is expected that this will be overcome.

Dr. E. W. Gardiner, Standard Oil Co., told of recent developments in the use of inhibitors that prevent oxidation of turbine oils and that will give them an expected life of from ten to twenty years. Research likewise promises to bring about superior transformer and other insulating oils. Dr. Gardiner's paper will be published in a subsequent issue of ELECTRICAL WEST.

Joint meetings with the Administrative Services Section, which stressed personnel, are reported on p. 79.

Business Development

Milo Cain, chairman
Coast Counties Gas and Electric Co.
Santa Cruz

Henry C. Rice, vice-chairman
Southern California Edison Co.
Los Angeles

WITH almost identical programs but with different speakers and members of the lighting panel discussion, the two conference meetings of the Business Development Section gave a variety of impressions on some of the same topics and illustrated again the differences in viewpoint existing not only regionally but among individuals.

The San Francisco meeting, presided over by Milo Cain, began with an exceptional analysis of the competitive power outlook after the war, by J. P. McElroy, San Joaquin Power division, PG and E, which is published in full beginning on page 51.

R. A. Peterson, vice-president, Bank of America, handled the pertinent subject of *Term Payments Covering Appliance Sales* at the northern meeting, saying that 10,000 banks as well as old line financing companies were prepared to finance appliances again.

Johnson Rapp

Baugh Morris

That the supposed liquid and cash paying status of people today will not last and term sales will again be needed, he first demonstrated. As to Regulation W, which now curtails credit financing, he hoped it would be removed, pointing to the dangers of government credit control continuing.

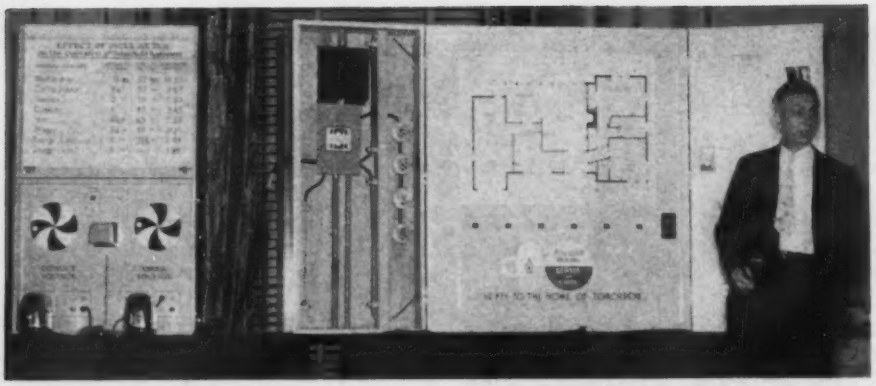
Peterson bravely tackled the question of long-term financing of appliances and kitchens under Title II of FHA along with the financing of the house itself. He enumerated the problems in connection with it and asked for the help and advice of the electrical industry to determine how far this should go. Under Title I, for modernization, he said there was a definite possibility for the financing of home rewiring on four- to eight-year liquidation loans. He also discussed the G.I. Bill and its provisions for loans to veterans for the starting of a business. His opinion was that the banks would be cautious in such loans and seek to analyze the veteran's chances of making a success of such ventures.

Elbert Kramer, educational director, Better Home Department of Westinghouse Electric & Mfg. Co., Los Angeles, gave the San Francisco meeting a talk not on the Los Angeles program. It was the "Electrical Living in 194x" story of home building potentialities after the war, when an estimated 500,000 to 700,000 homes will be built per year for the first five years after the war. He then showed what it would mean to the industry to equip such homes with electric kitchens, laundries, adequate wiring and lighting and many of the specialties such as Precipitron air cleaning, germicidal lamps, infrared heating, etc. A sound-slide film was also shown and Kramer concluded by telling of the distribution of the booklets prepared by his company through the utilities, first to architects, builders and contractors, and later another booklet to customers.

With 14 Home Planning Institutes launched in northern California and nine in southern California, Graham Holobird, National Electric Products Co., San Francisco, outlined the progress, the programs, the sponsorship, the speakers' bureaus and the results and attendance at these courses conducted by the adult education branches of the public schools. The value of these preparatory, non-commercial, comprehensive courses in the guidance of people who intend to build new homes after the war was emphasized by many indications of the favorable reactions obtained already from the courses. By the end of the year, next June, 25 courses will have been run in northern California, 14 in southern California, Holobird announced.

Kidding and debunking the wild publicity current in magazines which is misleading the public to expect miracles from appliances of the future, W. A. Cyr, associate editor, ELECTRICAL WEST, drew the subject over the line between the blissful sublime to the completely ridiculous in an illustrated parody talk, *The Dream Home of the Future*, at both conferences. He illus-

Hayden Hixson Tenney Doerr Wellhouse Maddox



With spectacular demonstration boards, J. A. Hill, PG and E, gave a sample of talk on adequate wiring presented to home planning institutes in northern Calif.

trated such dishwashers as dispose not only of garbage but dishes as well, recasting the residue into new dishes, automatic washers that wash the person, clothes and all, electronic devices to reject Fuller Brush men but admit appliance salesmen, a " regrettor" to displace the doghouse, and hot and cold electric blankets.

The adequate wiring demonstration which he and other speakers in northern California are making to the Home Planning Institutes was given completely to the meeting by J. A. Hill, PG and E, at the opening of the afternoon session. With a clever, portable display board and appliances he showed the effects of poor voltage on appliance speed and cost of operation, illustrated the need for adequate copper carrying capacity and ended by showing many devices and fittings that add to the convenience of wiring.

Ben D. Moses, University of California agricultural college, at Davis, after reviewing progress in farm electrification in California since 1894, a 50-year span, enumerated a few of the unusual applications now found in farm usage—such as debeaking of chickens, pig brooders, dehydration and electrical pasteurizing — let his imagination wander to many developments he would like to see made. Among those he said he hoped might be developed were the sterilizing of eggs by high frequency, electric vacuum cleaners for poultry houses, air-conditioned chicken houses, stimulation of turkey egg fertility by lighting, panel heating for farm homes, sterilizing of grains by heat lamps or high frequency in a continuous process. Others he mentioned were an electrically driven tractor, utensil washing and sterilizing, an electric hoe, clamp-on water heaters for wash water, electric knife to cut honey combs and thermostatically controlled heaters for honey melting, frost prevention, infrared drying of paint, humidity control for incubators to maintain high humidity, electronic hay dryers, photocells for grading, a surgical knife for veterinaries. He also commended the farm advisors and urged that every effort be made to solve the farmers' needs.

The Los Angeles meeting was scheduled in somewhat different order. The morning meeting started with Cyr's debunked "dream home," and was followed by a report on the Home Planning Institutes by Victor W. Hartley, managing director, PCEA and the adequate wiring talk given to southern California institutes by A. B. Smedley. Henry C. Rice, vice-chairman of the section, turned the meeting of the morning over to E. W. Meise, San Diego Gas & Electric, and the afternoon meeting to C. L. Moore, Chicago Flexible Shaft, presiding chairmen.

Hartley added information regarding the wiring appraisal chart prepared by the adequate wiring committee of PCEA and its fine acceptance by the banks and lending agencies. Meise announced that the first of San Diego's institutes was to begin Nov. 20.

Smedley has a completely different technique in telling the adequate wiring story to the public, going through many of his translations of the industry's technical material into publicly understood wording. For example he compares wire size numbers to spool thread sizes, the larger the number the smaller the thread.

For the industry itself Smedley offered the novel idea that step relays, used so extensively in aircraft to control all kinds of loads by means of low-voltage push buttons, be used in home wiring to control switching and furnish control points everywhere desired. This would offer tangible convenience and be readily salable, he said.

The term-financing story was told at the Los Angeles meeting by H. H. Christensen, chairman, committee on installment credits, California Bankers' Assn. Applying wire size analogies to credit information he asked for help from the electrical industry in determining what financing should be done. He declared banks well staffed and anxious to finance appliances or kitchens, flooring plans for dealers and other forms of credit. Because banks are close to the people of their communities he felt they would give quick service, collect in ways not to make dealers sorry they had turned the paper over to them. He urged that everything be done to remove Regulation W and discussed its hazards to business. He, too, touched on Title I and Title II financing, the G. I. Bill and ended by recommending the reading of the CFD booklet on bank credit.

J. J. Duell, California Farm Bureau Federation, talked straight farmer language to the section and the electrical industry in his farm electrification address. He declared that utilities of the West could not rest content with the high percentage of farms served electricity. They would need to abandon the old policy of expecting full return

Meise Christensen Moore Rice Chamberlain Thompson Borland

Moses Peterson Kramer

before making extensions and see that every farm was served. Whether it paid or not, the government would do it, if they failed. "Harold Ickes heads the list of people you have to be afraid of," he said.

Duell then listed a number of needs farmers have for power on an intermittent or occasional basis but which they cannot afford with high demand charges based on connected load. Rain machines, dehydrators, feed grinders and mixers, milking machines, dairy sterilizers, soil heating, welding machines, brooders, electric fences, insect traps and electric service to farm labor camps — all considered undesirable loads to the utilities, are highly necessary and desirable to farmers and should somehow be worked out mutually.

E. J. Baughman, Edison General Electric Appliance Co., closed the Los Angeles meeting to a far too small remaining audience for the clever and humorous talk he gave on commercial cooking. He told his story in reverse, explaining goodhumoredly "all the things that are wrong with commercial cooking." "It has no industry support, equipment is priced too high, it causes more trouble, cooks won't use it, utilities do not give it sales help, rates are too high, complex, it is oversold, we don't know what we are selling, salesmen are not trained and even the government puts too high priority on it."

Then he reversed himself and treated with each of these difficulties. He advocated forming a PCEA cooking advisory board, selling of counter equipment first, showing comparisons, selling only approved equipment, hiring of ex-service men with electric cooking experience as cooks—even setting up an employment agency for them—organization of a commercial cooking department, simplification of rates, again presenting comparisons, use of common business sense, selling of adequate food service, establishment of training schools and finally of making organized representation to Washington for the same break in equipment production as gas.

Cain Lazarus

New Light Sources Panel

Controversial subject in the trade, when exposed to the enlightened intellects of a panel of experts at both meetings, the new light sources and their effect on business gave forth but a pleasant glow, alarming to nobody. The moderators who put the controversial questions were George C. Tenney, editor, ELECTRICAL WEST, at the San Francisco meeting; George M. Rankin, Southern California Edison Co. and regional vice-president of the Illuminating Engineering Society, at the Los Angeles meeting.

Panel members in San Francisco were: O. R. Doerr, general commercial manager, PG and E; R. L. Hayden, sales manager, Coast Counties Gas & Electric Co.; M. C. Hixson, manager, Pacific Division, General Electric Lamp Department; J. A. Maddox, manufacturers representative for both domestic and commercial fixtures; and F. J. Wellhouse, Westinghouse Electric & Mfg. Co.

At Los Angeles the panel consisted of A. I. Benedict, manager commercial sales, San Diego Gas & Electric; H. J. Chanon, illuminating engineer, General Electric Lamp Department; L. A. Hobbs, manager, Smoot-Holman Co.; L. A. Rice, Electrical Products Corp.; F. K. Sampson, Kirstner, Curtis & Wright, architects; and Frank Wagner, Wagner-Woodruff Co. Fred Doolittle and M. A. Sawyer, who had given a paper on effects of fluorescent lighting on distribution systems before the Operating Economics Section, were also asked some questions at the Los Angeles panel.

Much of the descriptive matter relating to light sources and their characteristics was so similar to that published in the September issue of ELECTRICAL WEST that it will not be repeated for lack of space. Some interesting comments from the discussions at both meetings are worthy of more extended treatment and will be made the subject of an article in a later issue of ELECTRICAL WEST.

Administrative

William deWaard, Chairman
San Diego Gas and Electric Co.

G. F. Maughmer, Vice-chairman
General Electric Co.
San Francisco

PERSONNEL, customer relations, accounting, purchasing and credit procedure were re-examined by the Administrative Services Section, meeting first in parallel and finally in joint sessions, which brought out new findings in problems which have taxed utility management since Pearl Harbor and before. Personnel was given special emphasis at joint meetings with the Operating Economics Section.

Accounting

Accounting groups, led by J. S. Bordwell, California Electric Power Corp., south, D. G. Martin, Pacific Gas and Electric Co., north, were concerned primarily with the mechanics of compiling, despite manpower shortages, the ever increasing reports required of them.

In San Francisco, A. T. Kelly, PG and E, described his company's use of tabulated cards in pay roll work. The PG and E system is a machine method of securing rapidly and accurately supplemental data required in making the various reports to state and federal government, employees and others covering tax and other payroll deduc-

Heseman Bordwell

de Waard Maughmer

tions. Using an operations chart as illustration, Kelly showed how the machine could be used to secure six separate pay roll accounting reports from the same basic picked cards. The meeting concluded with an informal round-table discussion led by Martin on the new 1945 withholding requirements.

Interest at Los Angeles centered on machine accounting procedure and results obtained from it, as presented by G. C. Delvaille, Calif. Elec. Power. He illustrated with enlarged photographs the machines, the cards, the codes, and told of extra accounting work taken on by the department, even including stores accounts, with less help, an important wartime benefit. Other discussion topics included pay roll procedures and records, under J. A. Talley, Calif. Elec. Power; income tax deductions, under R. E. Fife, Southern California Edison; stores accounting, under W. F. Ruth, Calif. Elec. Power; and clearing accounts, by C. W. DeVoe, San Diego Gas & Electric.

Purchasing and Stores

Purchasing and stores sessions were sponsored in the north by H. H. Scoville, PG and E, in the south by J. K. Uhler, So. Cal. Edison. Control should be maintained in one central purchasing department for *all* purchases, and not too many people should do the ordering, A. C. Werden, So. Cal. Edison, told the Los Angeles group, discussing control of purchases and accounting of material and equipment for generating plants and substations. In this way a check could better be kept on obsolete and surplus materials, he maintained. As a corollary, R. M. Taylor, So. Cal. Edison, pointed out the need to keep specifications up to date. During the war, due to lack of time, this has been neglected, he said, and without accurate specifications, purchasing would become confused and wasteful. The same topics were discussed at San Francisco, under George Coughlan, Jr., PG and E, controls, and F. L. Smith, PG and E, specifications.

Postwar credit and collection procedures and accompanying personnel policies were discussion topics at a joint meeting in San Francisco of the credit and collections group (E. T. Crick, PG and E, sponsor), customer relations group (Charles Grunsky, Coast Counties Gas and Electric Co. and F. U. Naylor, PG and E, sponsors), and the personnel group (A. J. Noia, PG and E, sponsor). Similar discussion was held at Los Angeles, except that the personnel group held a separate session, under guidance of R. G. Kenyon, So. Cal. Edison, to weigh technical details of personnel department operation, forms, records and policies. Credit and collections at Los Angeles were under A. L. Code and customer relations under C. M. Campbell, both So. Cal. Edison.

Credit

How to get credit and collection departments back into harness postwar, and effects on public relations of necessary wartime relaxations were prime considerations at both northern and southern meetings. "Sit tight until action is needed, then ask for meter deposits" was the advice at San Francisco with regard to postwar re-establishment of credit for wartime industries. Any other procedure probably would require regulatory changes, it was pointed out, although resumption of bi-weekly or weekly collection of hazardous accounts was suggested as a safeguard likely to be welcomed by certain classes of business. Many subcontractors doing war work, and whose electric bills now are guaranteed by the prime contractor, will need to have credit re-established when they convert to peacetime production, it was maintained at Los Angeles. It was stated that the same holds for many farm customers, whose production is "over their heads" to force lend-lease food quotas. Here, too, necessity for possible changes in regulations to permit readjustments was discussed.

A tendency to get away from domestic meter deposits was reported at San Francisco, although it was admitted that amount of deposit and type of community were determining factors. Refunding after 12 months of deposits taken was recommended as a means of eliminating trouble and expense for the company and building good will. On the other side, was the experience in one community, with a high population turnover, where a six-month curtailment of meter deposits resulted in a loss of 20% of the closing bills. Customer convenience in the cases where the deposit is relied upon as an aid in paying the closing bill also was considered. Information received with the deposits is more important than the money, it was stressed, and the public does not object to answering properly worded inquiries.

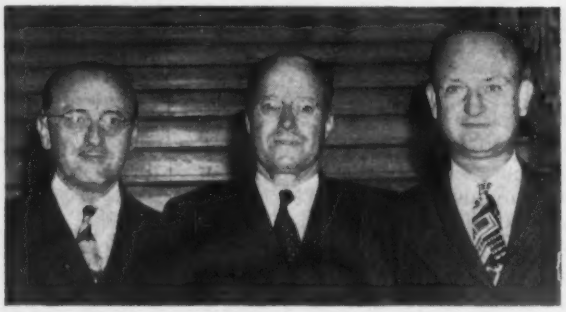
D. C. Griffin, So. Cal. Edison, presented a simplified analysis method for diagnosing the financial statements and balance sheets of prospective customers to determine credit risk. This will be published later in ELECTRICAL WEST for general use of the industry.

If the federal government goes into long-term financing postwar, it behooves the utilities to do so also, unless they wish to turn over merchandising to dealers, it was brought out in the San Francisco discussion. Regulation W was pronounced a little severe, although the consensus was for curtailment of credit postwar, with 24- to 36-month terms favored, 48 months frowned upon. More lenient credit terms are one sales effort, Charles Grunsky reminded the group, and should be used only to keep sales up.

Collections

Since total revenues are involved, customers who pay their bills are entitled to see a utility make every effort, whether successful or not, to collect from non-payers, Grunsky declared in a discussion of collection policies at San Francisco. Granting that there are going to be a good many domestic closing bills immediately following the war, it was suggested that the utility make it as easy as possible for the customer to pay. One possibility, already tried out in some instances, is to permit servicemen to figure closing bills when they read the meters. A skeleton bill was declared an aid by proponents of this plan, who feel that any small error in figuring the bill would be counterbalanced by advantages. A variation of this plan was to have the serviceman phone in the reading to the office, which would prepare the bill and have it ready for the customer in case he wished to call

Gray Kenyon



Naylor Grunsky Crick

for it before leaving town. The delayed lock policy, practiced by the majority of utilities as a wartime measure to conserve rubber and manpower, is being regulated to prevent penalizing the customer, it was stressed, and there have been few complaints.

Opinion was divided on the return of the bill passer postwar to communities where he had been forced out by war restrictions. With three-cent postage, bill passers save the company money; with two-cent postage it is a toss up, it was pointed out. Where the bill passer rings the bell and makes a reasonable wait, another customer contact is established, it was maintained, although some claimed that the contact might be bad and that efforts might better be concentrated on a different type of employee for follow-up work. The old, the infirm and those too busy to get to the company office, like the service, it was pointed out, and where an objection is encountered, the name can be coded and the bill mailed. With neighborhood pay stations, mailing of bills is working out satisfactorily in San Francisco, it was stated.

Consensus both north and south was that, although the public has accepted graciously bi-monthly billing as a wartime necessity, it would prefer and demand a return to monthly billing after the emergency. Instances have been found, even now, where a double service charge for one bill is resented, it was pointed out, and in at least one case, a customer has taken the matter to court. Also to be considered is the necessity to make jobs for returning service men, since the percentage of meter readers with the armed forces is high.

Better and quicker turn-on service must be restored as soon as possible, the Los Angeles group declared. The problem in rural areas where long trips often are necessary to turn on service will continue to plague utilities, it is believed.

It is a mistake to loosen up on credit policy when conditions are good, since such action is no favor to the customer and does not build good public relations, was the opinion expressed at San Francisco during a discussion of handling shut-off notices. The collector should be trained properly, however, it was emphasized. Several of the utilities favor coding customers and allowing them to build their own credit ratings.

Treat all customers like the service man was the suggestion offered at San Francisco in discussing the advisability of making collection procedure less stringent for service men and their families. Each person is an individual and requires individual treatment was the general opinion.

Collection work is specialized and it is preferable to secure junior clerks from the outside and train them properly rather than by transfer from other departments, it was suggested.

Collection agencies were declared advisable in collecting closed accounts only where the address of the delinquent is unknown. Experience with subagencies was varied, and the opinion seemed to be that the entire question needs exploration. Unless the basis of pay is satisfactory, and it is hard to make it so in wartime, transactions are not going to be handled properly, it was pointed out.

Personnel

Re-employment of returning service men was discussed at the joint meeting of all Administrative groups. That the veteran is often mentally confused and needs advice and assurance was submitted by Hance Cleland, who reported briefly on experiences at San Diego since his detailed account at the spring meetings. To inquiries regarding training of supervisors to handle neurosis cases, Cleland replied that there is a government booklet, *How to Treat the Returned Disabled*. William deWaard warned, however, against too hasty judgment, and urged that the man be put back in his old environment, be allowed to ride around for a few days with the foreman to get his interest back. In many cases, the neurosis will disappear, he believes.

Most of the companies represented are making surveys of jobs that can be done by the partially disabled, who, it was pointed out, often make more satisfactory employees than the unhandicapped; most of them, too, are planning to give the totally disabled accumulated sick leave or other benefits. For those who do not wish to return, it was suggested by Noia, that a letter be secured to that effect. Merchant marine personnel returning under Public Law 87 should be advised to visit the War Shipping Administration and secure certificates, it was brought out.

In reporting experiences with J-I-T at the northern meeting, greatest satisfaction was expressed by representatives of San Diego G & E, where utility staff instructors have been used, and of Coast Counties G & E, where the only complaint was in the follow through.

Afternoon discussion of personnel problems was continued at both Los Angeles and San Francisco in joint sessions with the Operating Economics Section.

Testing Programs

Making no exaggerated claims but setting them forth as a valuable working tool when properly used, Dr. Edward K. Strong, Jr. of Stanford University spoke at San Francisco on use of psychological and aptitude tests in employee selection. Previously interested mainly in picking the man best fitted for a particular job, during the last few years, business men have become interested in the second point of view, that of getting the employee contented and happy in the job, he declared.

The employer's first question, "What can the man do right now," may be answered by standard educational tests, which Dr. Strong claims are better than could be worked up individually without great labor. Trade tests were developed during the last war and USES has extended them, he said. However, a testing program cannot be handed out on a platter, he declared, and for best results employees of known ability should be tested and their scores used as a gauge.

Code Wright Long deWaard

To determine how well a given person can learn and how complex a job and relationships he can handle, Dr. Strong recommended the intelligence test. Grade jobs and then avoid giving a high intelligence person a low intelligence job, if you don't want to court personnel troubles, he advised. A person a little below rather than above the range of intelligence of those successful on the job, is to be preferred, he suggested.

In testing aptitude for a specific job, observation may be better than performance tests, Dr. Strong maintained, since what a person sees determines his rate of performance. Interest tests, covering some 35 occupations, are significant but not guaranteed, he said, and no personality test has been developed which warrants use except on an experimental basis.

Incentives

Incentives and their relation to good will were discussed at San Francisco by Arthur A. Dobson, vice-president Albert Ramond & Associates, Inc., who declared that incentive in some form is a part of our daily lives. Pointing out that profit sharing and bonus plans are hard to administer and prizes are temporary, Dobson recommended the incentive wage as dealing directly with the task.

Some good incentive methods have failed because they were badly administered, Dobson stated, and full explanation of the plan must be given at the outset. Prime requisite is a sound accurate basis of standards, he maintained, with cooperation of labor in formulating the plan and proper time reporting as other "musts". Never should the incentive wage be considered as anything but an extra, he warned, and such factors as fatigue and breakdowns must be measured. Prompt handling of grievances, maintenance of work standards, absence of fear that the employee will work himself out of a job are essential to a well-working plan, he declared. If the problem can be solved bright days are ahead and it can be solved if employers work hard enough at it, he concluded.

Training

Pay roll is one of the biggest items of expense of doing business but employee training as a whole is too frequently neglected, said Morris B. Pendleton, President Plomb Tool Co., in discussing *Employee Training—Its Value and Possibilities* at Los Angeles.

Good employee training, according to Pendleton, depends mostly upon doing the things you know you should do but never get around to. Industry should bring employees into itself, tell them what the score is, identify them with the business, he declared, then they'll willingly give their utmost to the job.

It is important that supervisors be well trained and have proper compensation, Pendleton stated, because to each employee the company means his immediate boss. A good way to start a training program is from the top down, he believes, and mediums which he suggested are: conference, employee newspaper or magazine, annual report to employees written in their own language, employee handbook. Plomb has had success with a periodical questionnaire to determine how employees regard the company and its employee activities.

Industrial Relations

There is no inevitable conflict between employer and employees, since each is dependent upon the other, and thus dealings between them should be such that both gain. This was the philosophy of industrial relations as interpreted at Los Angeles by Robert C. Gray, professor of economics and industrial relations at the California Institute of Technology. Good industrial relations is the cornerstone of good public relations; it increases production and lowers costs, raises the morale of employees, he maintained.

Type of program chosen should depend upon the character of the business, Gray believes, taking into consideration percentage of expense going to labor costs, size of company, its stability and whether it is a centralized or decentralized business, profits, general business conditions. For a successful program, according to Gray, policies should be established by management and should be uniform; the organization must be carefully selected and trained, must understand the job and reasons for procedure; techniques should include job instructor training, selection of employees, participation in wage setting, compliance with changing statute and administrative laws. A personnel department should interpret labor legislation; should have time to look into future policies, he declared.

● Indoor Climate Institute held its annual meeting recently in Detroit to set up a nation-wide organization and to outline the aims and policies of the group. A series of panels and seminars was held to cover the subjects of public information, research and development, setting up of local chapters, a speakers' bureau, affiliation of trade associations, industry promotion and postwar personnel. It is to be expected that local chapters will be organized in each of the major cities and centers to coordinate the trade associations and those engaged in any phase of heating, ventilating and air conditioning.

IBEW Classes

Preparing themselves for the complications of electronic circuits and wiring, journeyman electricians of Local No. 6, International Brotherhood of Electrical Workers, in cooperation with the University of California are carrying on extensive educational class work at the U. C. Extension Division quarters, 20 Second St., San Francisco. Two classes, carrying on an 18-week course, have been in operation on Mondays with attendance of 66 and Tuesdays 74, and a third class started recently with an enrollment of approximately 50. Arrangements were being made also for a swing shift class to be run from 12 p.m. to 2 a.m. which would bring total enrollment well over 200 in this educational work. According to Ed Robinson, assistant business agent, the classes are distinctly for journeymen with considerable experience and are not beginners' classes in electronics. Instructor is F. E. Strauss, of General Electric Co., for the two established classes and other instructors are being provided for the new classes being formed.

Go To Milwaukee

Four locals of the International Brotherhood of Electrical Workers from the West Coast plan to send members to Marquette University, Milwaukee, for a special training course on installation, maintenance and repair of industrial electronic equipment sponsored by the International Brotherhood of Electrical Workers. The course is a six-week course. Locals take the responsibility of financing their members and paying their traveling expenses while the IBEW headquarters pays tuition and other course expenses. So far the locals in San Diego, San Jose, Portland and Seattle have arranged to send students to the course. Those sent on their return will act as instructors for other members of their locals.

San Francisco EMEA toured the San Francisco Examiner on Nov. 16, following procedure from copy desk to delivery of the paper on the street. This treat, rare in wartime, was arranged by the Examiner's chief electrician, George Corcoran, an EMEA member. At a meeting before the inspection trip, Earl Prudhomme concluded a series on electronics with the showing of a sound slide film, which presents a condensed course on the subject.

Synthetic Rubber

Discussed by EMEA at Los Angeles

Synthetic rubber, a much discussed subject, was the main event at the Nov. 15 meeting of the Electrical Maintenance Engineers Assn. of Southern California, in Los Angeles, but the card had three other events on it that night—an electronics class, the incorporation of the association, and a metal detector which started its career in mining, now is employed in war, and has uses in industry. Julien H. Davis, consulting engineer, president of the EMEA, added another when he bestowed upon F. L. Hockensmith, organizer of the association, its first honorary membership. A nominating committee was also appointed to select next years' officers.

F. S. Carpenter, general manager, Torrance synthetic plant of U. S. Rubber Co., and a group of engineers, scientists and research men, were introduced by Howard Park, maintenance engineer for the plant. Carpenter then gave the most lucid, complete and understandable talk on the various synthetic substitutes for natural rubber heard in many a day, remaining to answer a multitude of questions. The place synthetic rubbers may be expected to take in postwar usage he also discussed frankly. These uses will depend largely upon the special qualities of either natural rubber or a specific synthetic to do certain things and upon the competitive market and the price of natural rubber, he indicated.

Following Carpenter an explanation of an electronic device for detection of the presence of any metallic substance was given by Harry Forr, Goldak Co. Used principally as a pipe and cable locator, it is sensitive enough to detect the presence of unwanted metals in a batch of substance such as synthetic rubber which otherwise would go undetected.

John Fiske, electronic specialist, Westinghouse Electric & Mfg. Co., gave the third of a series of lessons on electronics prior to the meeting. President Davis appointed a nominating committee consisting of Howard Park, chairman, Michael Winters, Tom Hineman and Harold Hunt. The December meeting is to be the annual tabletop exposition.

Get Charter

The initial meeting of the newly organized Rocky Mountain Chapter of the American Society of Heating and Ventilating Engineers was held recently in Denver, Colo., at which time the members were presented with a charter by Alfred J. Offner, consulting engineer in New York City.

J. H. McCabe of Denver was elected president of the chapter. Other officers: George D. Maves, vice-president; William McCoy Larimer, treasurer; Frank L. Adams, secretary, and James J. Johnson, John Bernzen and Dan J. McQuaid, board of governors. All officers except Bernzen, whose home is in Boulder, Colo., are of Denver.

● REMI BOLLAERT, Westinghouse engineer, described the mass spectrometer before a meeting of the AIEE, Los Angeles Section, recently. By means of this electronic device, complicated gas molecules can be analyzed in minutes instead of hours or days, Bollaert said. Molecules of gas, traveling at approximately a million feet a second, are shot by high-voltage electricity through a target where they are counted electronically to determine the structure of gas being manufactured. Principal wartime use of the apparatus is the checking of elements that make up petroleum products. It was developed primarily as an aid to the emergency rubber program.

Signing incorporation papers for Electrical Maintenance Engineers Assn. of Southern California were its officers and directors: seated C. R. Miller, vice-president; Julien H. Davis, president; Nels E. Swanson, secretary; standing, Walter Smoker, Walter King, Carl Trainor, Henry Bush, D. H. Byl and Walter Ritter, directors

IES Officers Installed

The Rocky Mountain Chapter, Illuminating Engineering Society inaugurated its 1944-45 season during the visit to Denver of James Ketch (see p. 67) at which time new officers were installed.

As the original sponsor for the chapter, Ketch was paid this honor by the members of the organization. Officers whom he installed: T. J. Vieau, chairman; Howard F. Cummings, secretary-treasurer; and a board of managers consisting of J. A. Setter, past chairman; W. B. Carrol; Ray N. Hankins; T. M. Foulk and Leigh Congdon. Members of the AIEE, the AIA as well as the IES were invited to the meeting.

T. W. Fitch, Portland General Electric Co., discussed *The Field of the Illuminating Engineer* before the Oregon Chapter IES, at the first luncheon meeting of the 1944-45 year in November. A canvass of membership indicated a preference for regular luncheon meetings with an occasional evening meeting for an outstanding program, Secretary George G. Geddes reports, and accordingly the section will meet on the second Wednesday of each month at the Chamber of Commerce for lunch.

Committee chairmen recently selected for the new year are: Hugh L. Bargion, Westinghouse Electric & Mfg. Co., attendance and arrangements; L. J. Collins, Portland General Electric, membership; Walter A. Marquis, Foster & Kleiser, program; Leighton E. Roy, Portland Optical Co., *Illuminating Engineering* reporter.

In a double-feature program in November, the Southern California Section IES heard George Rankin, regional vice-president IES, tell of important discussion at the recent Chicago conference; saw and heard an illustrated (and often humorous) slide lecture on *Unusual Patents* by Bill King, Electrical Machinery Mfg. Co., assisted by Charles Mullenbach, Mullenbach Electric Co. For the December meeting, the section had scheduled an inspection trip through the El Segundo plant of Douglas Aircraft Company.

E. H. Grogan, secretary of the Stockton Electrical Contractors Assn., has been made field representative for the Northern California Conference of Plumbing & Heating Industry and State Assn. of Master Plumbers of California, Inc., with an office in the Phelan Bldg., San Francisco.

East Bay Electric Club, at its November meeting, heard John W. Millunchick, district electrical engineer, the Austin Co., on *Engineering 24-hour Daylight*. Approximately 100 slides were used to illustrate this talk, which dealt with light, air and temperature control.

J. G. Miles, Jr., Westinghouse Electric & Mfg. Co., was the speaker, *Better Wiring for Better Living* the subject scheduled for the Dec. 1 meeting of the Seattle IAEI.

ELECTRICAL WEST

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Television Interference

RUMOR has it that the quick development of television will be one of the great postwar undertakings. Radio people, so it is said, look upon television as the "new" industry to give business the same sort of a lift that radio itself did after World War I. Television, it is claimed, will give jobs, provide an outlet for capital, call for new construction, create new businesses and generally contribute to the economic well-being of the nation.

This is good news in most respects to the electrical industry. However, the possibility of such a development has its concomitant troubles. One of these is the matter of interference from faulty electrical equipment and electrical circuits. For a long time radio interference was the bane of the power companies and much time and trouble was required for its elimination. Now a well-informed radio technician is authority for the statement that the troubles from radio interference will seem like a Sunday school picnic compared to what confronts the utilities when every home has a television set. The ear, he claims, will forgive background noises, scratches and other extraneous sounds attendant with ordinary amplitude modulated radio equipment. The eye will not. Television will dip down into the usual noise levels that do not seriously affect sound radio. The result will be distorted images, fleeting black specks and blotchy black lines upon the image screen. The public will not accept this type of service. And the job of cleaning up the interference will fall to the utilities as it did with radio. The problem is one which merits serious consideration in any power company postwar planning.

New Incentives

ONE of the major changes a utility which decides to do no actual selling of merchandise must make is that of viewpoint. This viewpoint must be carried down from top management to the former salesmen. Their attitude toward their job must change. Their incentives must be adjusted. No longer do they have the satisfaction of the closing of an individual sale, the urge of earning more commission, the thrill of a contest and competition.

It takes a different kind of salesmanship. It is more a job of voluntary sales management for the dealers with whom they work. It takes greater skill. And it should earn better rewards.

Salesmen may be just journeymen under an IBEW classification in a closed shop utility. But these new sales managers for dealers are really professional and executive. They are entitled to be rated as such, trained as such and paid as such if they are to accomplish the delicate, tactful, indirect job of getting dealers and dealer salesmen to do the selling for them and their utility. This is something the commercial executives need to consider in their postwar plans and policies.

Time Now For Cooperation

DEFEAT of Referendum No. 25 by almost 70,000 votes definitely clarifies the public power situation in the state of Washington. The election marks the demise of attempts to set up "super-PUDs" which could have run amok in taking over the properties of the business managed utilities and in setting up virtually impregnable public power monopolies beyond the reach of any public regulation.

There were many significant aspects to the election and to the vigorous campaign which preceded it. The utilities took their case to the people openly and directly and opposed the measure strictly on its weaknesses. In this fight they were joined very largely by organized labor, which seems to have no stomach for negotiations with federal bureaucrats or public agencies. The bad labor relations record of the statewide Nebraska PUD had a definite bearing on the position of labor in the Washington battle. The major municipal utilities were either lukewarm or definitely opposed to the meas-

ure. It is notable that it lost in both Seattle and Tacoma. The unsatisfactory record of the existing PUDs, particularly those which have collected in taxes and spent upwards of $400,000 on legal, engineering and other fees without operating any electric facilities whatever, brought a revulsion in popular attitude.

One thing which the election proved is that the vocal and vociferous Washington State Grange with its federally stimulated public power hangers-on does not represent the majority opinion of the state. Under the circumstances it should now be possible to induce the Washington state legislature to make two badly needed amendments to the present PUD law. One would permit the disorganization of a PUD by popular vote if the people were convinced that the presumed benefits from such a public power agency were never to be forthcoming. This would appear to be the case with many existing non-operating PUDs. The other amendment would give the public an opportunity to vote upon any bonds which were to be issued for either purchase or duplication of existing utility facilities—a right which they do not have at present.

However, there are other even more significant aspects to the situation. Even a cursory study of conditions indicates that the Pacific Northwest has before it the brightest electrical future of any region in the U. S. Fulfillment of the opportunities which the future holds will depend upon close and complete cooperation between the federal, the municipal and the business managed power agencies. In throwing out No. 25, the public has indicated that it not only wants but expects that kind of cooperation.

Reconvert to What?

INDUSTRIALISTS and business leaders of the West, in common with the rest of the nation, are sorely wrought up over the subject of reconversion. Could it be that here in the Far West the people are failing to see clearly the true nature of the postwar industrial problem?

Reconvert means to convert back to something, but here in the West what has industry to convert back to normally? The Far West had some prewar industry, but most of its war-inspired industrial development has been new, and the products themselves have been war goods. The basic problem, therefore, is not one of going back to what we had, but of finding a way to go forward with new products and goods which will keep the West's new industrial plants working and producing. It is a question of developing a host of new small industries which can use the output of the steel and light metal plants. It is a question of product research and design and of detailed market study.

If Western industrial and business leaders define the problem in this light and proceed to solve it, then the industrial future of the region is bright. There will be jobs for the new workers which have moved into the area and for the returning service men. And equally important to the electrical industry, there will be new markets for equipment and supplies to implement the required industrial plant facilities.

Thus the objective of the West is not to effectuate reconversion in the strict sense that the term implies. That would be tantamount to saying that we were satisfied with the prewar industrial status of the region. The real objective is to retain the new industrial facilities created by the war and turn them to the production of goods that will find ready acceptance in the market places of the world.

Election Is Over

AMERICANS shake hands and go back to work for the good of the nation, now that elections are over, and this industry is a good citizen and does so. The fact remains, however, that the civil war for survival which the private utilities have had to fight, just goes on for four more years. Although numerical count was no mandate, the New Deal already has announced the intent to start several new TVAs, need them or not, and Congress is asked for appropriations to extend the federal network. Foot-slogging along, there's no relief from this war.

JN talking with my own crew, I often say to them that the artist when he gets ready to paint a beautiful picture doesn't just stand off and throw handfuls of paint at the canvas and then hope that the result will be good. What does he do? He proceeds with meticulous care. First he lays out the perspective of the landscape, if it is to be a landscape, and then, little by little, with one daub of paint after another, he builds up that picture until it becomes the beautiful thing upon which we like to gaze. So it is with this matter of public relations, in my opinion. It isn't the one great big thing you do, or the two or three big things you do, and then sit back and say, "Isn't that a swell job?" It is the building up, day by day, hour after hour and minute by minute of these little particles of right doing and right thinking and right practicing of the golden rule that finally results in the beautiful picture which is represented by ultimate good public relations.—*Paul B. McKee, Pacific Power & Light Company.*

NEWS of the industry

REFERENDUM 25 REJECTED BY WASHINGTON VOTERS

Referendum 25 was defeated in the State of Washington at the November election by a vote of 338,030 to 269,264. A ratio against the measure of about 55.6% held in both eastern and western areas of the state.

The proposal would have permitted two or more PUDs to unite into super PUDs for the purpose of taking over private utility companies in the state.

Proponents of the measure, chief among whom was the Washington State Grange, based their campaign on the theory that it was the public power measure. "If you are for public power you will vote for this measure," was the approach. Opponents attacked the bill on its faults.

The cities of Seattle and Tacoma, chief strongholds of municipal ownership and operation, both defeated the measure by about three to two. Other parts of the state served by private uility companies likewise returned substantial majorities against it. One of the localities in which the measure found its chief support was in Grays Harbor County served by the Grays Harbor PUD.

In the same election a PUD proposal to cover rural areas in King County, the county in which Seattle is situated, failed to pass.

Navy Asks Seattle to Drop Rate to Bonneville Level

Reduction in Seattle City Light's electric power rate for four installations to the level of the Bonneville wholesale rate has been requested of the Seattle City Council by the Navy Department. The installations which would be affected are the Seattle Naval Station at Smith Cove, The Naval Air Center at Sand Point, Puget Sound Bridge & Dredging Co. Shipyard and the Todd-Pacific Shipyard on Harbor Island.

A threat to bring Bonneville power direct to the four installations over city lines, if rates were not lowered, accompanied the request. It was pointed out, however, that, under an agreement with the City of Seattle, Bonneville will not retail power in the city without its permission.

J. A. Hunter, civilian superintendent civil engineer in the area for the Bureau of Yards and Docks, told the council that the present disparity in rates between City Light and Bonneville "means that the Navy Department is paying $250,000 more per year for electricity . . . than if permitted to buy direct from Bonneville as required by the President's directives."

As a further argument, Hunter pointed out that City Light has set up a large postwar reserve, which he characterized as "solely war profits, nearly all directly attributable to Navy billings, to Navy institutions or to increased population due to the war effort." He also stressed that no federal taxes are being paid by the city against such profits as an aid to the war effort.

Bonneville Planning Link With Shasta Dam Postwar

A line extension from Eugene to Klamath Falls, Ore., as a part of an eventual link with Shasta Dam in northern California, will be an item in the next Bonneville budget, according to announcement of Dr. R. B. Thompson, Bonneville consultant. The line would not be built until after the war, he stated.

Dr. Thompson has advocated organization of a PUD to distribute the power. A resolution favoring a Bonneville line into the city has been passed by the Klamath Falls City Council, and a county chamber of commerce committee has been appointed to consider policy.

Officials of California Oregon Power Co., now serving the Klamath Falls area, reportedly have stated that the company would compete with any rates offered in that territory by a public power group.

● GRAY'S HARBOR PUD bonds will be purchased by the First National Bank of Portland in a refunding issue as of Jan 1, 1945. Original issue on Jan. 16, 1940, was for $3,350,000 in 20-year serial revenue bonds bearing 4½% interest. The refunding issue will be in the amount of $2,600,000, with interest at 2% on bonds maturing from one to ten years and 2¼% on the remaining five-year maturities.

● RECENT REA allotments include loans in Arizona and Colorado. The Littlefield (Ariz.) Electric Cooperative will receive $18,000 for construction of 14 miles of line. Sangre de Cristo Electric Assn., Salida, Colo., will receive $152,000 for construction of 72 miles of line and acquisition of generating facilities and 29 miles of existing line.

NEW HETCH HETCHY PLAN SENT TO WASHINGTON

A new plan for disposing of Hetch Hetchy power, long a problem to the City of San Francisco, was being considered in Washington late last month. Two alternatives were attached, when Interior Department officials indicated that a provision for resale to PG and E would not be acceptable under the Raker Act.

The proposal involves sale of the entire Hetch Hetchy output to irrigation districts of Modesto and Turlock in the San Joaquin Valley, thus entirely eliminating the Pacific Gas and Electric Co. from the deal so far as the city is concerned. The districts, however would resell to PG and E, now a customer for excess power generated at Modesto district's Tuolumne River plant. Until Interior Department officials demurred, this was thought to conform to the Raker Act, which allows for sale to municipals and irrigation districts.

Under one of the alternative plans, San Francisco would use a portion of Hetch Hetchy power to supply municipal needs, selling the rest to the irrigation districts. Under the other, the city would serve Mare Island and Hunter's Point Navy yards, supply municipal needs and sell the remainder to the irrigation districts.

The first plan would allow San Francisco to realize revenue of $2,400,000 annually. Either of the alternatives would mean a decrease in net revenue of $800,000.

Originally proposed by the irrigation districts and backed by city officials, the new plan was taken to Washington by Clifford Plummer, Modesto Irrigation District engineer.

A federal court injunction against the City of San Francisco, prohibiting sale of the municipal power to the private utility is effective March 1.

● THAT the voters be allowed to decide whether or not a franchise should be granted to the Salem Electric, a cooperative, was asked recently by Portland General Electric Co.'s president, James H. Polhemus. The company has offered to share with the coop the expense of a special election, rather than to charge it to the public. In the event that the coop feels that defeat of the franchise would be unfair in view of its investment, PGE has offered to buy out its properties at a price to be determined by a disinterested appraiser.

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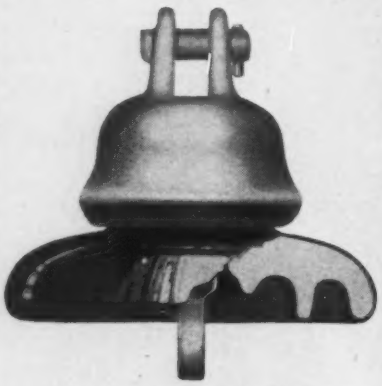

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UTAH POWER & LIGHT LOWERS IDAHO RATES

In a voluntary effort to maintain equal basic rates in the two states, Utah Power & Light Co. has reduced Idaho schedules to meet the 12½% reduction ordered for Utah.

The Utah rate cut, amounting to approximately $1,500,000 annually, was ordered by the state public service commission and was sustained by the state supreme court. (EWest November). The company did not ask for a rehearing.

Idaho customers, principally residential and commercial, will receive reductions totaling approximately $145,000 annually.

Sacramento District Gets Condemnation Judgment

Sacramento Utility District last month was awarded a judgment by Superior Judge C. U. Goodell of San Francisco in its condemnation suit against the Pacific Gas and Electric Co. In long-pending proceedings, the district is seeking to acquire PG & E properties in the Sacramento area.

Valuation claimed by the district is $11,632,000, a figure set several years ago by the California State Railroad Commission, plus improvements made subsequently. PG and E contends the original valuation was too low, and it is believed that the utility will appeal the case.

Public Service of Colorado Will Acquire New Properties

Public Service Co. of Colorado will purchase the Pueblo Gas & Fuel Co. for $400,000, it was announced recently by company officials following approval by the Securities and Exchange Commission. The Pueblo operation, which supplies the southern Colorado city with natural gas, will be continued under the same name and management, it was reported.

Under terms of the purchase, Public Service company will pay $400,000, representing 3,500 shares of the Pueblo firm's $100 par value common stock, to Cities Service Power & Light Co., the parent organization, which will apply the sum to the payment of bank loan notes held by the Chase National Bank.

● ORGANIZATION of Northern Counties Utility Co. as a subsidiary of Fruit Growers Supply Co., Los Angeles, Calif., recently was authorized by the State Railroad Commission. The utility will supply electricity, water and telephone service to 6,000 residents of Westwood, Lassen County, Calif. The utility was formed in connection with the purchase by the Supply company of the lumber manufacturing plant of Red River Lumber Co., including the townsite.

Cooperative Accepts Utility Offer to Construct Line

Rejecting $260,000 offered by REA, directors of the Foothill Electric Assn., Fresno, Calif., voted last month to accept a proposal of Pacific Gas and Electric Co. to build a transmission line through the foothills into the eastern part of Fresno County. The action came as a surprise to many, since the directors had met presumably to execute a note and mortgage with REA.

PG and E made several offers during the negotiations, the last one being a proposal to install the line at no cost to consumers. Action of the Foothill directors must be ratified by several hundred members before it becomes effective.

New Proposal Considered In Pepco Reorganization

Pepco Independent Trustees have asked the U. S. District Court for permission to join with Portland General Electric Co. in working out a reorganization plan to be submitted to the Securities Exchange Commission. Four original plans submitted by the trustees, a committee representing prior preference stockholders, a bondholders group and Guaranty Trust Co. were rejected by the commission, and to date only Guaranty has filed an amended return.

The plan, submitted in court by Thomas W. Delzell and R. L. Clark, proposes sale of $42.000,000 of new bonds to refinance the debt of PGE. Investments, cash on hand and other assets amounting to about $8,000,000 also would be included in the refinancing program.

● THE FEDERAL POWER COMMISSION has published for the second consecutive year a 10-page report entitled, *The Financial Record of the Electric Utility Industry*. Covering the period from 1937 to 1943, the report is available from the commission upon request.

● ADDITIONAL generating units approved recently by the Office of War Utilities include a 7,500-kw. unit at Provo, Utah and a 5,000-kw. unit at Colorado Springs.

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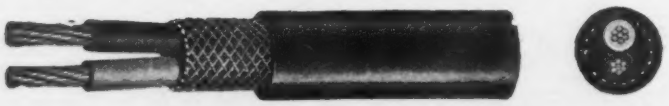

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COAST PLANT ATTACKS WMC WORKER CEILINGS

In what is reported to be the first legal attack on the War Manpower Commission's authority to set worker ceilings, the Industrial-Marine Electric and Engineering Co., San Francisco. has filed suit in Federal Court seeking an injunction and $500,000 damages.

Naming the WMC's labor-management for Northern California defendant, the suit charges that the WMC does not have legal or constitutional power under either the War Powers' acts of Congress or subsequent presidential directives to prevent men from working by establishing ceilings.

According to the complaint, men recruited to work on an electrical contract sublet to Marinship Corp. in Sausalito, Calif., were refused employment on the ground Industrial-Marine has no ceiling. The company was established after October 1943, the date used by the WMC in determining worker ceilings for plants in critical labor areas. Men refused employment. it was stated, belonged to the International Brotherhood of Electrical Workers, Local 6, the union with which both Industrial-Marine and Marinship hold contracts.

Industrial-Marine holds contracts, including naval, for new construction and repair work.

WLB Sets Age Limit on Retirement Deductions

In a recent decision, the Tenth Regional War Labor Board in San Francisco ordered Pacific Gas and Electric Co. to discontinue deducting retirement income payments for the wages of employees who remain in service beyond the normal retirement age.

Involving 101 operating employees in the East Bay, North Bay, San Jose and San Francisco divisions of the company, the board's action decided a dispute between PG and E and the Utility Workers Organizing Committee, local 133 (CIO). The utility also must restore all deductions made subsequent to March 18, 1944, when the case was certified.

Finding that "retirement income is an annuity and separate from wages," the directive order held that the deductions constituted a reduction in salaries of employees who had reached retirement age under a company plan but who had continued in their jobs as a result of manpower shortage.

● Bids were received last month by the USBR for a 20-ton hoist elevator to be installed at Shasta Dam.

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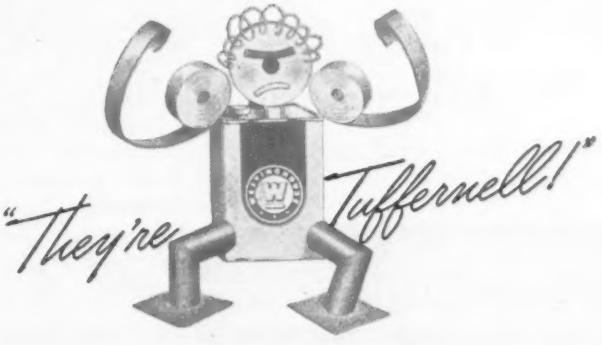

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TACOMA REINSTATES NISQUALLY ENGINEER

Reinstatement of Verne Gongwer as engineer in charge of construction of the Tacoma, Wash., Second Nisqually power project and dismissal of the Charles T. Main Co. of Boston, Mass., as consulting construction engineers were announced recently by Tacoma Utilities Commissioner C. A. Erdahl.

The Main company was engaged to supervise construction in May 1943, after rapidly advancing labor and material prices had raised considerably the original cost of the project, which was designed and begun under the direction of Gongwer.

Delayed completion dates resulted in the second change, it was reported. One year's delay in completion cost the City of Tacoma $1,000,000 for purchase of electricity from outside sources and $1,300,000 for additional engineering and interest charges, according to Commissioner Erdahl. Total cost of the project, including construction of two dams and power plants, now is estimated at $23,000,000.

Twelfth Unit Goes On Line at Boulder Dam

With installation of a twelfth 82,500-kw. generating unit at Boulder Dam power house last month, plant capacity was increased to 1,034,800 kw. In addition to the 12 82,500-kw. machines, the installation to date includes a 40,000-kw. unit and two station service generators.

Power generation began at Boulder Dam in September 1936 and, in June 1937, the first power was delivered. Plant capacity at that time was approximately 330,000 kw.

Excavation Begins for Coulee Dam Caisson

Excavation of a channel leading from the Columbia River to a caisson drydock for Grand Coulee dam has begun, it was announced recently, preparatory to construction of a floating submerging type caisson for maintenance of the dam spillway bucket.

More than 400,000 cu. yd. of earth will be removed from the channel through which the caisson, when completed in the drydock, will be floated to the river and maneuvered one-half mile upstream into position over the bucket. The permanent drydock will be used for erecting, maintaining and housing the caisson.

Meanwhile, flood conditions simulated to the estimated peak flow of the Columbia were being created on a 1-to-60 scale model of the dam located upstream. Purpose of the tests is to secure data for designing equipment for routine repair work on the spillway section and to determine the effects of flood waters on the dam, it was reported.

PGE Floats Walking Dredge On Roslyn Storage Lake

To remove two million yards of sand and silt in Roslyn storage lake near Portland, Ore., Portland General Electric Co. recently completed floating a 165-ton electrically driven suction type "walking" dredge on the lake, according to company officials.

The dredge will be in use for several years removing one million yards of sand and silt deposited in the lake since 1912 when the 22,000-kw. Bull Run hydroelectric plant began operating, and another million yards to increase the lake's capacity.

The 60x24x6-ft. steel hull purchased from the city of Albert Lea, Minn., had to be quartered for transportation. These sections were floated separately and then joined together in the water. A 300-hp. motor powers the pump to force silt through a 3,000-ft. pipe line. It is expected to be operating in January.

James H. Polhemus, PGE president, negotiated the purchase last June, and A. J. Porter, engineer and rate analyst for the company, directed disassembly in the middle west and reassembly in Portland.

Plans for Electrifying Tunnel Undetermined

Clarifying rumors that the Denver and Rio Grande Western Railroad Co. intends to electrify the Moffat Tunnel through the Rocky mountains in Colorado, E. A. West, general manager of the road, recently stated plans for electrification were in the "conversational" stage.

"We have had plans in mind for several years, looking toward electrification of certain 'humps' on the mail line of the railroad, among which would be the Moffat Road from Denver to Tabernash, Colo.; Soldier Summit from Helper to Thistle, Colo.; and Tennessee Pass from Malta to Minturn, Colo.," West said. "Numerous plans have been submitted, but as yet no determination as to what will be done has been made, nor has any money been appropriated for such work."

● WASHINGTON WATER POWER CO. won first place in its division in the National Safety Council contest.

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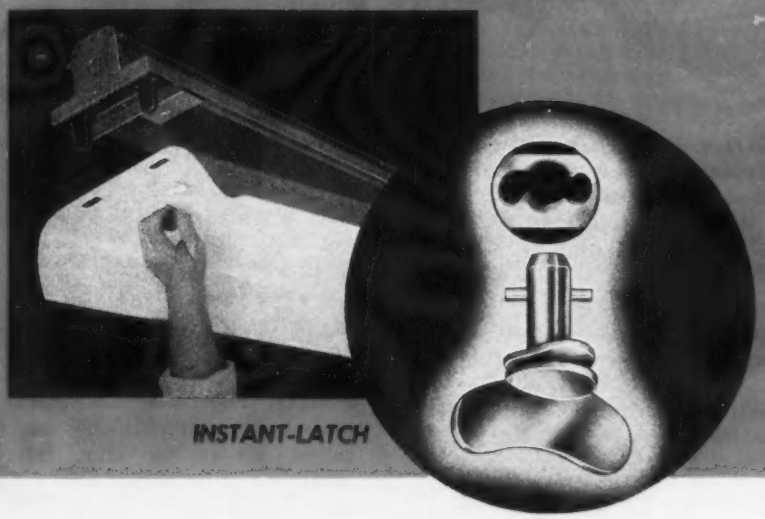

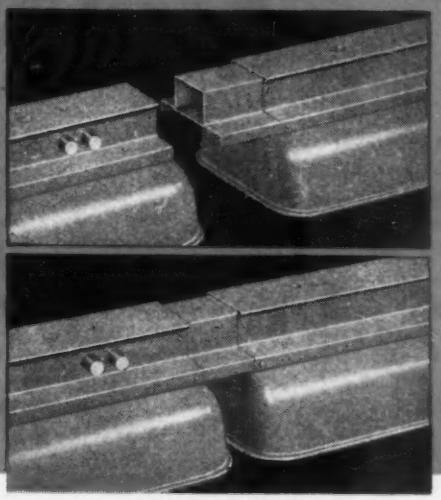

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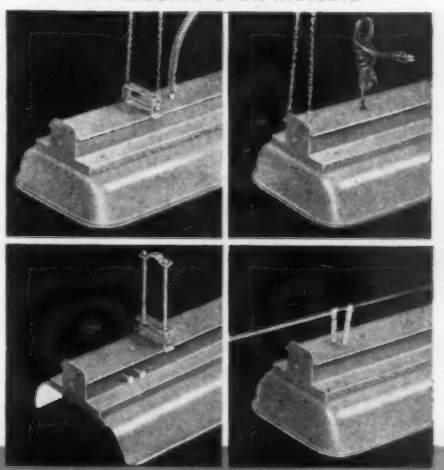

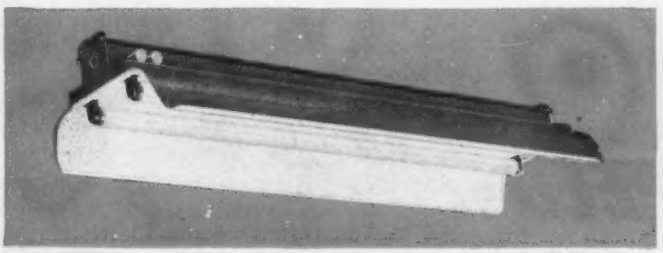

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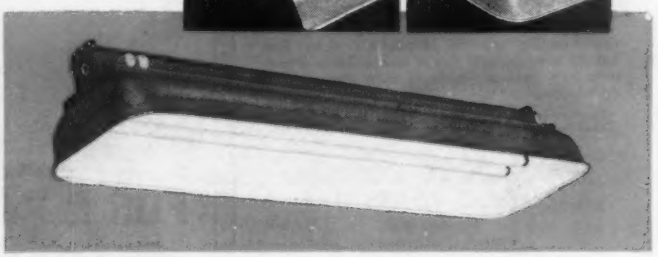

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MANUFACTURERS CHARGED BY JUSTICE DEPARTMENT

Twelve manufacturers have been charged with conspiracy to eliminate competition in the sale of drop-out fuse cutouts by the Justice Department. A civil complaint charging that the defendants were licensed to manufacture and sell the items at prices as high as those fixed by two of the defendants, Line Material Co. and the Southern States Equipment Corp., was filed in the U. S. District Court at Milwaukee. The complaint seeks invalidation of the licenses and permanent injunction against their enforcement.

Other defendants are General Electric, Westinghouse, Pacific Electric Mfg. Co., Porcelain Products Co., R&IE, James R. Kearney Corp., W. N. Matthews Corp. Royal Electric Mfg. Co., Schweitzer & Conrad, T. F. Johnson.

● UTAH POWER & LIGHT CO. line crews became amphibious recently to restore service on the company's Grace-Montpelier 44-kv line, when two transmission line structures located in the bend of Bear River tipped. Since the ground was inaccessible to teams or trucks, six rowboat trips were required to transport men, equipment and material to the job. J. C. Goff, Preston division superintendent of lines and service, was in charge of the crew, which traversed ten inches of mud and water, a railroad grade and the Bear River to restore service in record time.

● IMPROVED water conditions following fall rains permitted B. C. Electric to lift power restrictions early in November. The restrictions were imposed on the lower mainland last May when a power shortage threatened due to low rainfall and light snows.

● CONSTRUCTION program for Bonneville's new Columbia, Wash., switching station was under way in mid-November with the awarding of a $69,732 contract to Dan J. Malarky of Portland, Ore., to build reinforced concrete control and oil houses at the site.

● FORMATION of the Electrical Consumers Assn. of Northern California was reported recently. One stated goal was to secure a reduction in electric rates; another to seek direct distribution to consumers of Shasta power.

● CHICO (Calif) City Council recently filed without comment a report of City Manager H. H. Hume on municipal ownership and operation of public utilities in California.

THE FAR EAST

Frontier for American Enterprise

IN THE great tradition of America, our frontier lies to the West. But for a United States that stretches from the Atlantic to the Pacific, to Go West is to arrive in the Far East. The feet of literally millions of our young men are now set upon that route.

Accomplishment of their objective—the defeat of Japan—will not end our responsibilities to the Orient any more than the defeat of Germany will end our responsibilities to Europe. This time we mean to see the venture through.

The first sketch of a political program for enlisting the strength of nations of good will to enforce the peace was drawn at Dumbarton Oaks. That is a good start. But those who participated know how much work remains before the blueprint becomes a fully matured plan, the plan becomes a structure, and the structure takes life and effective being in the living imagination and will of the peoples of the world.

No political accord, however high its purpose, can endure for long if it depends upon the loyalty and support of populations embittered by hopeless poverty that is offered no promise of relief. The poisonous dust of mass despair makes inevitable an ultimate explosion, whether it be sparked by a torch supplied from without or by its own internally generated heat. Much of the Far East is sufficiently close to that position to pose a grave problem to the Western world. It is of particular importance that American business men and workers alike recognize the nature of their responsibility in the matter, for to them the great area of the East presents also an opportunity and a challenge.

☆ ☆ ☆

The Orient—stretching in a vast semicircle from Manchuria and Japan to India and Ceylon—is the home of more than a billion people, the world's greatest potential market. In its mountains are the earth's richest stores of tin and mica; its deposits of iron ore, coal, and manganese rival those of France, Russia, and the United States. Its rice paddies are the most productive in the world, its coconut and rubber plantations the largest, and its cotton production is of major volume.

And yet, this fabulous region—with its riches of manpower and raw materials—suffers from living standards at the lowest rung of the world scale. With as much as 85 per cent of the populations of this great area devoted to the production of farm products, starvation has been an endemic plague to countless millions of its inhabitants, and will remain so until they graduate from the crudely primitive methods of the crooked stick and the bamboo plow to the use of the implements of a modern world in both agriculture and industry.

The improvement of agricultural methods and the burgeoning of industrial development depends upon tools—a preponderance of simple tools, no doubt, at the beginning, for modernization of economic processes is a development that cannot be forced at a rate faster than the ideas upon which they depend can be developed. If we, in the United States, are to hope to supply a major portion of the implements upon which the salvation of the East depends, we must be prepared to export also the skills and technologies which will make their effective use possible.

The possibility of a world market for machinery and manufactured products is a challenge that American industry cannot afford to ignore. The United States will emerge from the war with almost half of the world's industrial capacity within its borders, with much more than half of the heavy industries. Drastic and painful readjustments are inevitable; but they can be mitigated to the extent that we can find outside markets for the products for which we have excess capacity.

We shall find ourselves, at war's end, in a singularly favored position to compete in any equipment markets which are open. It is not merely that we shall have the productive capacities crying for outlets. Aside from Germany and Japan, which for some time will not be in a position to compete, our two major industrial Allies, Great Britain and Russia, will face enormous tasks in providing for their own rehabilitation. Neither of them is likely to be in a position to export more capital than they absorb; and although Canada, Sweden, and Switzerland will be, the United States will stand alone as the one major creditor nation in the world. If the potential advantages of this position are managed with wisdom and imagination, they will enormously enhance our opportunities for supplying a great share of the capital goods demand of undeveloped areas.

☆ ☆ ☆

What is the dimension of the Far East's potential demand? What are some of the difficulties standing in the way of its being realized?

If needs were the only measuring stick, the Far Eastern market would provide a bottomless pit into which even the great stores of our exportable capacity could be poured with room to spare.

China, alone, with its teeming population of 450 millions, has spelled out needs in dimensions large enough to stir the imaginations of the equipment producers of the world.

Business Week (February 5, 1944) supplements Dr. Sun Yat-Sen's spacious first estimates of the requirements for a thorough-going industrialization program with figures provided by current Chinese planners—25,000 locomotives; 300,000 freight cars; 20,000 passenger coaches; 20,000,000 tons of steel; and 90,000 power driven machine tools for the first five years of reconstruction. An American manufacturer of farm equipment, who recently surveyed the agricultural requirements of China, estimates an ultimate Chinese market for 20,000,000 tractors.

India's drawing-board plans are equally expansive. According to the bold pattern drawn up by a group of Bombay industrialists—some of whom are due to visit the United States early in 1945—India, after the war, will require a capital investment of $2,000,000,000 a year over the next 15 years, of which $250,000,000 per year for the first seven years will be in the form of imported capital goods.

Included on the huge import order list of the Bombay executives are mining, roadbuilding and power station equipment, heavy locomotives, metallurgical plants, agricultural machinery, and a long list of machine tools.

There can be no question of the need of these countries for the industrial equipment—and for many items of manufactured goods—which we are so eminently in a position to supply. But realism requires that we measure this demand against the Far East's probable capacity in the relatively near future to absorb industrial goods.

A Chinese economist has estimated that China, in 1937, had a total industrial capital investment of about $1,000,000,000 in American values, or something like $2.50 per capita of population. In contrast, the American investment, in manufacturing facilities alone, is now more than $600 per capita.

What it could mean in terms of capital goods requirements if China alone carries out this dream of modernizing, not to the utopian level of the United States but to the present modest level of the less developed Soviet Union, is typified by measuring just three lines: 500,000 tons of steel a

year, for five years, to add 12,500 miles to the railroad system; 2,187,500 motor vehicles; 3,300,000 telephones.

But it is one thing to cite mountainous figures demonstrating needs. It is another, and far less optimistic exercise, to find assurance that practical opportunities for satisfying such needs can be made to materialize. Let us face some of the major difficulties and see if they are insurmountable.

☆ ☆ ☆

The first hurdle to be cleared is the question of whether or not we want to promote the industrialization of the Far East. The wisdom of doing so has been vigorously challenged. The negative argument, on the economic side, generally runs thus: If we provide industrial equipment to backward economic areas, we deprive ourselves of the greater long-run opportunity of selling them manufactured articles which our aid has enabled them to produce for themselves.

It is only fair to say that such a thing might happen—that it has happened in isolated instances in the past. But the overwhelming weight of economic history demonstrates that the broader attitude is also the profitable one.

The United States itself is the living refutation of the fear which now cramps the outlook of many of its own citizens.

From 1790 until 1850 the foreign trade of our new fledged Nation had many of the characteristics which pertain to the trades of China and India today. We imported manufactures and we exported raw materials, agricultural products, and newly mined gold. Our imports exceeded exports, the difference being made up partly by payments to us for shipping services and partly by industrial development loans. It is relevant to inquire how the trade of the lenders was affected by this policy of supplying us with industrial capital and machinery.

From 1850 through 1939 the pattern of America's foreign trade changed. Slowly at first, and then at accelerated pace, our import ledger showed a percentage decline in manufactured goods and a percentage rise in raw materials to feed our expanding industrial facilities. But while finished manufactures declined percentagewise in our import budget, so great was the increase in our total foreign trade operations in the century from 1830 to 1930 that our imports of manufactured goods increased more than twentyfold, and they more than doubled between 1900 and 1939.

Clearly industrial Europe gained rather than suffered from the industrialization of the United States, and it is equally clear that we, in turn, shall benefit from the industrialization of the world's undeveloped territories. Further evidence is provided by Canada which, with its high industrial development but only 12 million people, buys from us each year almost as much as the relatively unindustrialized 130 million people south of the Rio Grande.

If it be granted, as I believe it must, that the development of Far Eastern countries will be to our advantage as well as theirs, the second question that we should face is the speed with which it can be accomplished. Is there genuine promise in the proximate future of opportunities for American enterprise of the magnitude set forth in the estimates quoted above?

In all fairness, I am forced to state my conviction that the road is longer than is indicated by Chinese and Indian leaders. It is natural, and far from censurable, that their eyes should be focussed upon the urgency of national needs, rather than upon obstacles in the way of their fulfillment.

On the other hand, it is possible that our own long process of industrialization may lead us to conclusions of undue conservatism. Ideas, once they break the crust of resistance are the most contagious of bacteria, and the tempo of their infiltration seems to increase by geometrical progression in a world of swift communication.

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In an interesting recent study of The International Labor Office, it is suggested that the general economic level of the rest of Asia outside Japan in the late 1930's was not dissimilar to that of Japan in 1900. Between 1900 and 1936, Japan increased its total capital investment more than threefold devoting between 10 and 17 per cent of its annual income to capital outlays. A comparable tempo of development for China, India, and other Asiatic areas would result in a capital expansion that would dwarf to insignificance the most optimistic blueprints that have been put forth to date. I am not suggesting this as a likely possibility, but rather as a caution lest we, in the name of hard-headed realism, underestimate Asiatic potentials as much as their own nationals exaggerate them.

Finally, in appraising the outlook for American enterprise in Far Eastern markets, we collide, head-on, with the problem of how we are to be paid. Here, hard-headedness can be only a virtue, for the lack of it will breed inevitable disaster for the Asiatics as well as for us.

In the last analysis, the dimension of the American market in the Far Eastern countries will be determined by the dollar exchange at their command, obtained through the products, goods, and services which they are able to provide to us, with due allowance for multilateral trade arrangements. It is true that the balance temporarily can be distorted through the extension of developmental loans. There is little question but that such loans will be in order after the war, and if they are wisely made, for productive projects that eventually will increase the exporting capacities of the countries to which they are extended, they can be thoroughly justified. But the best loans provide only a temporary expedient. In the long run, the balance of current payments must be restored with sufficient margin to provide interest payments and finally amortization of principal.

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How, then, are we to attack the problem of increasing our imports from the Orient?

In 1937, the total exports of the Far East amounted to something over $5,000,000,000—a little less than $1,500,000,000 in foodstuffs, a little more than $2,500,000,000 in raw and partly manufactured materials, and better than $1,000,000,000 of manufactured articles. Of this total, the United States purchased only about 20 per cent—approximately 10 per cent each of the foodstuffs and manufactures, and 30 per cent of the materials.

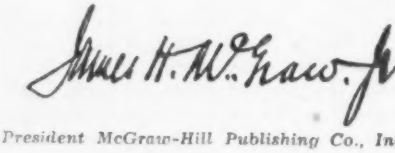
Despite changes in our technologies which will probably reduce our future takings of such important items as rubber and silk, the achievement of a high level of economic activity in this country after the war will provide a basis for increasing our Eastern imports, but only if it is an accepted part of our national policy to do so.

This means an alert and aggressive exploration of two-way trade possibilities on the part of both American business and our governmental agencies. It cannot be done by either alone.

The war has dislocated many of the trade patterns that prevailed in the past. The East is hungry for the type of products which we, uniquely, are situated to supply, but it will make its bargains with those who will not only fill its needs but will also provide outlets for its produce. Even the prewar magnitude of the exports from this area provides ample margin for the most meticulous and imaginative shopping of Eastern markets with the aim of increasing the modest share of our prewar purchases. And a farsighted program of development loans can greatly increase the capacity of these countries to produce what we want.

In general, we can trust American enterprise to explore rigorously all likely export opportunities. But the equally vigorous investigation of import possibilities will require a break from past traditions on the part of American business and American government.

Both East and West must learn to think in new patterns for the successful opening of a new frontier.



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"AT" enclosed Circuit Breakers are regularly listed in 2 and 3 pole, 15 to 600 amps. incl.—125 to 600 V.A.C. or 125 to 250 V.D.C. Also in single pole 50 amp. frame size breakers, 125 V.A.C. or D.C.

"AT" Circuit Breakers are an insurance against damage . . . no live parts exposed. Long service life is assured, without repairs or part replacements.

Illustrated and described in Trumbullaid Circular 314 (revised).

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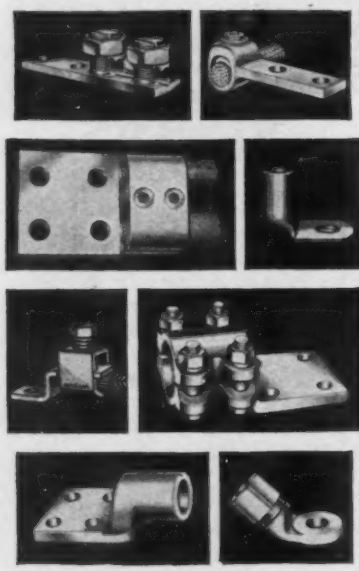

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TRADE *notes*

Sunnyvale Plant Making Generators for Russia

Thirty large turbo-generator units for delivery to Soviet Russia have been ordered from the Joshua Hendy Iron Works at Sunnyvale, Calif., it was announced recently by President Charles E. Moore.

Ten of the sets will produce 2,000 kw. each and the remainder 500 kw. each. The power plants, it is understood, will be used as package units to supply electricity in devastated factories and cities recaptured by the Russians from the retreating Germans.

Awarding of the new contract calling for early deliveries necessitates employment of more technical and mechanical workers at the plant, it was stated by Hendy officials, who at the same time anounced that they are submitting bids to several foreign countries for the manufacture of industrial power equipment.

Of a design developed by Hendy for installation as industrial or electric-generating plants, the turbines will be marketed by the company as one of its postwar products, it was stated.

In addition, the company currently is working on a $30,000,000 naval ordnance contract.

The 100th tanker to slide down the ways at Kaiser Co.'s Swan Island Yard in Portland was named in honor of the late W. L. R. Emmet, "father of electric drive for ships" and for many years a member of the G-E organization. Shown in the picture is J. F. Spease, G-E district engineer at Portland, who supervised installation of company equipment, including the 6,000-hp turbo-electric drive. This is the first tanker to bear the name of an individual, other ships having been named for historic battles or for cities

● RETIREMENT of Charles Farnham of Farnham & Cunningham, manufacturer's agents, and continuation of the business under the name of R. E. Cunningham & Son was announced recently in Los Angeles. The company has been representing manufacturers of power distribution equipment in southern California and Arizona for 18 years. C. E. Cunningham has been with the firm since 1932 and is a graduate of Stanford University in electrical engineering. Principal accounts represented include: Wagner Transformers, G & W Electric Specialty Co., Schweitzer & Conrad, Continental-Diamond Fibre Co., R. Thomas & Sons.

● EXPANSION of Glyptal Alkyd Resins and reorganization of the Glyptal field force has been announced by General Electric Co. The Paul W. Wood Co. of San Francisco and Los Angeles represents the product on the Coast.

● GEORGE MAGNES, formerly of Paranite Wire & Cable Corp. and now heading a firm of factory representatives known as Agencies Co., has moved into a warehouse location at 923 E. Third St., Los Angeles. The firm will develop and maintain a definite jobber policy for the following: Kondu Corp., Erie, Pa., manufacturers of threadless fittings; The High Tension Co., Inc., Phillipsburg, N. J., of transmission line accessories; Circle Wire & Cable Corp., New York, all types of wire and cable; Reynolds tric fans; Electric Cords Mfg. Co., Electric Co., Chicago, all types elec-Los Angeles, all types cord sets; Appleton Rubber Co., Franklin, Mass., friction and rubber tapes.

● ROYAL ELECTRIC CO., Pawtucket, R. I., has announced that it has purchased the fuse division of Colt's Patent Fire Arms Mfg. Co. and will make the "Noark" renewable cartridge fuse, under the name "Royal-Noark."

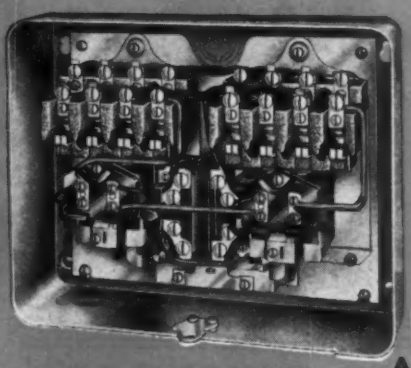
● REOPENING of its San Francisco sales offices in the Flatiron Building was announced recently by the Joshua Hendy Iron Works, Sunnyvale, Calif.

● WHEELCO INSTRUMENTS CO. of Chicago has named John G. Davidson, Denver, as its Colorado representative.

Federal INDUSTRIAL CONTROLS

engineered to *outlast* the equipment they control

Don't be surprised if the Federal controls you buy for one machine *outlasts* two, three or even four others. For—Federal builds 'em for long life. Designs them to withstand the rigors of hard usage. To take in stride shocks . . . vibrations — or what have you. Expect to find, too, ample wiring space . . . easily removable contacts . . . efficient operation . . . ease and economy in maintenance. For safe and dependable control of motor-driven machinery depend on Federal.



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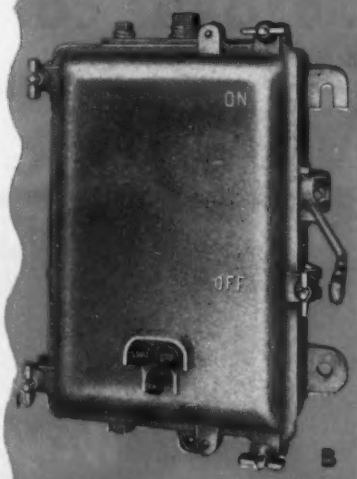


B

A. Reversing magnetic starter Type "A" sheet steel cabinet

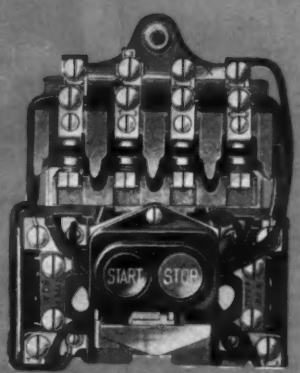
B. Combination motor starter Type "D" weatherproof cabinet

C. Manual Motor starter Type "A" sheet steel cabinet

D. Magnetic Motor starter Type "U"—inside only

E. Push button station

C



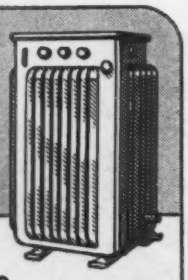
D

E

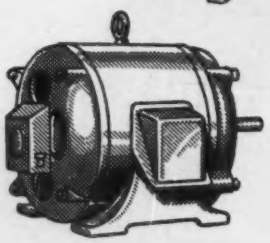
FEDERAL ELECTRIC PRODUCTS COMPANY

Plants at: 1429 Park Street, Hartford, Connecticut and 50 Paris Street, Newark, New Jersey

To Protect the Performance of Your Electrical Equipment—



USE *Pedigree* INSULATING VARNISHES



It's especially important to select the right electrical insulating varnish because it provides the protection that will add extra life to your electrical product. Good varnishes protect the quality of the parts they cover. Whether yours is a problem of water proofing, resistance to abrasion, oils, acids, alkalies, greater flexibility, or greater penetration, there is a Pedigree insulating varnish with qualities correctly balanced to give you the results you want.

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Robinson Sales Co., 3215 Western Ave., Seattle, Wash.

Harold Conklin Goes With Admiral Corp.

Harold L. Conklin, who in February of this year was transferred from the Coast as manager for Edison General Electric Appliance Co. to the factory in Chicago as manager of electric range and water heater departments, it was learned here by his friends, has now become affiliated with Admiral Corp. of Chicago as manager of its electric range department.

Of interest to the West also is that not long ago Admiral Corp. purchased the Stewart-Warner Co. and sold the latter's production facilities, dies, tools, etc. for making ranges and water heaters in Los Angeles to Kinney Bros. Its contemplated postwar line of ranges, refrigerators, deep freezers and other appliances, including radio and phonographs, are to be made in its Eastern or Middlewestern plants. Herbert Horne Co. is distributor for Admiral Corp. on the West Coast.

● THE SMALLER WAR PLANTS CORP. has announced award of a $50,000 contract by the Maritime Commission to the Pacific Electronics Co. in Spokane. The contract is for radio equipmen and runs concurrently with other war contracts now being filled.

● EARL S. CONDON has announced the appointment of Charles Morris as office manager and staff engineer of the Earl S. Condon Co., Los Angeles. Morris formerly was in the purchasing department of the Southern California Edison Co.

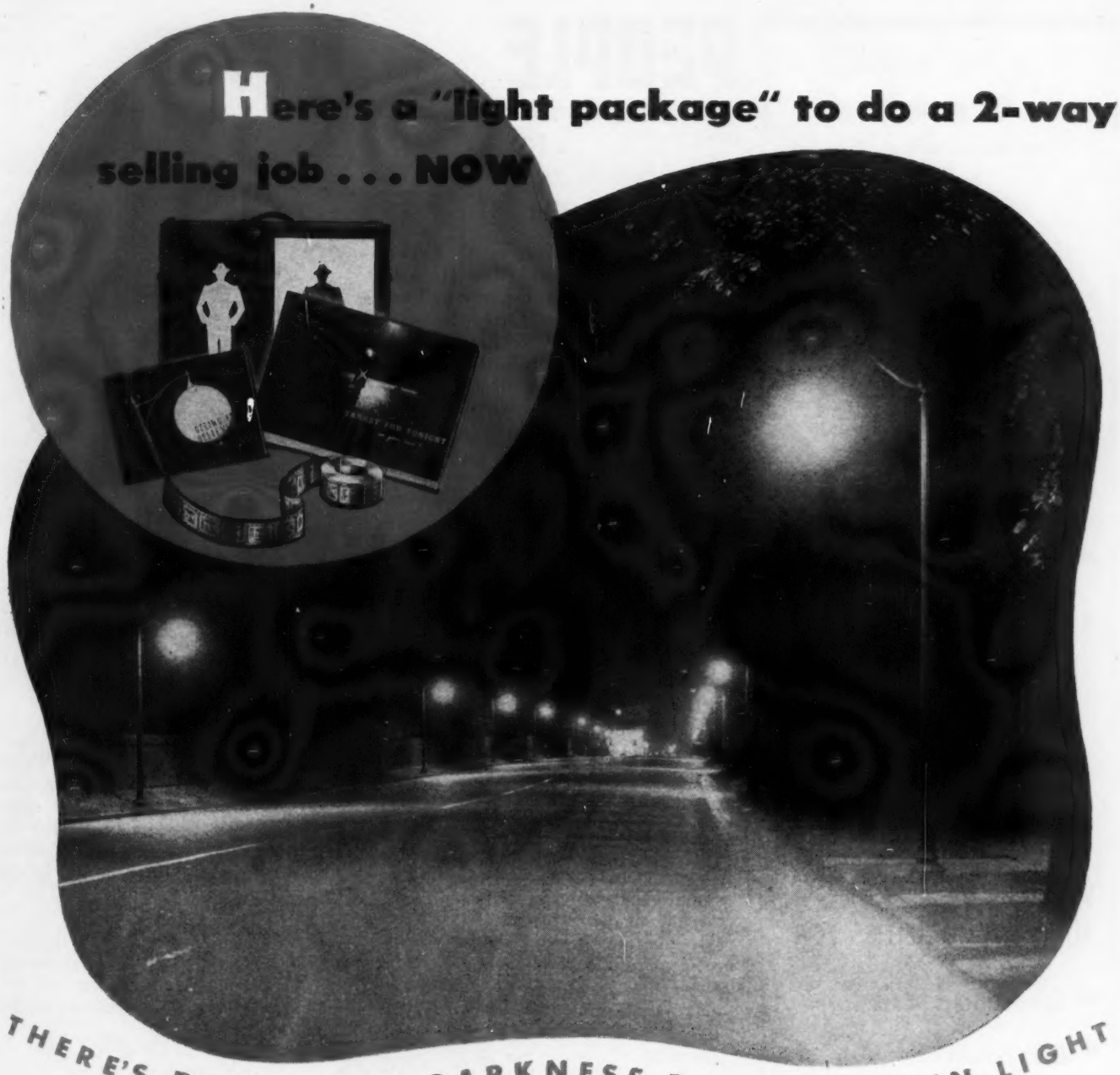
● THE EDWARD F. HALE CO. of San Francisco has been appointed postwar wholesale distributors for Stewart-Warner radios in the northern California territory. T. N. Biglieri recently joined the Hale organization as sales manager.

● EMERSON RADIO AND PHONOGRAPH Corp. has announced appointment of the Sunset Electric Co. as its distributor in Spokane and of the W. G. Walz Co., El Paso, Texas, as distributor in southwestern Texas, New Mexico and Arizona.

● WESTERN INSULATED WIRE, INC., has moved its Los Angeles executive, accounting and sales departments to the Chamber of Commerce Building, 1151 S. Broadway.

● SQUARE D Co. has moved its Seattle manufacturing and warehousing plant to a new location at 2310 Rainier Ave., zone 44, according to W. H. Bodle, manager.

Here's a "light package" to do a 2-way selling job . . . NOW



THERE'S DANGER IN DARKNESS BUT SAFETY IN LIGHT

Now is the time to start planning for adequate Public Safety Lighting : : : and Westinghouse is ready now with a new package of promotional helps to dramatize the need of improved street lighting to both the public and municipal executives.

This "light package" includes carefully-planned meeting guides for demonstrations before civic groups . . . sound slide films, charts, educational material, plus the services of Westinghouse Lighting Specialists.

Many utilities are now studying the problem of improved Public Safety Lighting as a means of creating public good will : : : an important contribution to solving community hazards of accident fatalities and juvenile delinquency.

Join the fight for better light . . . do it now. Write your nearest Westinghouse office today, or write Westinghouse Electric & Manufacturing Company, P. O. 868, Pittsburgh 30, Pennsylvania. J-04017

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Complete Electrical and Communicating Wire Service

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- Assemblies
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PEOPLE
made this news

Three Advanced by Utah Power & Light

Advancement of George E. Corey, Richard H. Jones and Ray H. Ashworth was announced recently by Utah Power & Light Co. Corey becomes vice-president and secretary, Jones, vice-president and Ashworth, commercial manager in charge of all division operations and commercial work. All three men started with the company in 1913.

Corey, who will continue as general counsel and a director for the company, started in the UP & L engineering department. After being graduated from the University of Utah law school in 1921, he was made assistant attorney and in 1929 succeeded as general counsel.

Jones started as a bookkeeper. In later promotions he became traveling auditor, office manager of the Salt Lake division and office manager of the construction department. He was made treasurer in 1919 after serving two years in the Army air service during War World I.

A graduate in electrical engineering from the University of Minnesota, Ashworth was first employed in the company's statistical department. Successively he was assistant to the general superintendent, assistant to the president and general manager, assistant to the commercial manager, and finally he was made general superintendent in 1938.

COREY

● KIMBALL I. JACK, supervisor of Washington Water Power Co.'s advertising department, has been named a national director of the Public Utilities Advertising Assn. and is serving on the board of the Spokane Advertising and Sales Assn.

● JOE J. FOX has been made sales manager of the Washington Water Power Co.'s Lewiston, Idaho, division. Fox had been Palouse division sales manager, with headquarters at Pullman. He succeeds Gordon F. DeFoe, now a lieutenant, junior grade, in the Naval Reserves.

● G. C. RASEY will supervise the marine and stationary diesel division of the general sales department of the Joshua Hendy Iron Works, Sunnyvale, Calif.

ASHWORTH

JONES

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string of insulators is the STRONGER?

For years, considerable strength variation in suspension insulators was accepted as inevitable. To be on the safe side, engineers would specify high average strengths beyond all reasonable requirements, just to be a little more sure of adequate strength; and pay a premium for it...This is no longer the case. Every O-B suspension unit is permanently branded with a strength rating--*minimum strength*. O-B suspension units may be combined and the strength of that string will have a known value... It took years of development in manufacturing, testing, and inspection to arrive at the point where specific minimum strength could be established. But, today, there is no longer any guess-work required in specifying insulators. You don't have to pay extra for more strength than you ever need, just to come a little closer to getting what you want. Buy O-B suspension insulators with complete assurance. They have the kind of strength that *counts* because you can *count* on it!

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CANADIAN OHIO BRASS COMPANY, LIMITED
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WITH WAR BONDS

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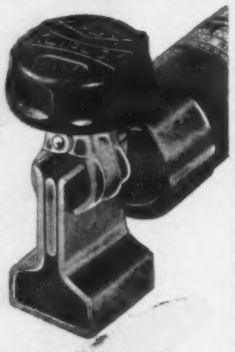

Make every job complete by installing TRICO KLIPLOK Clamps for fuse clips. That jack-screw pressure literally bolts the fuses and clips together!

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- Wasted current

Use TRICO KLIPLOKS freely to protect new clips and remedy old clips. Made in 10 sizes to fit all ferrule and knife-blade type fuse clips. WRITE FOR BULLETIN No. 6.

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A Life-time of safety first service.

Pulling fuses by hand is dangerous! It may result in serious shock, burn, infection and possible death. Key men and inexperienced workers need this protection. Lost time is lost production. USE TRICO FUSE PULLERS EVERYWHERE!

WRITE FOR BULLETIN NO. 5-A

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H. H. Van Luven, Los Angeles — Wallace R. Lynn Co., San Francisco
Albert S. Knight, Seattle — W. E. Young Co., Denver

TRICO FUSE MFG. CO. Milwaukee Wisconsin FUSES

BY THE MIGHT OF OUR ARMS WE SHALL ASSURE A LASTING PEACE

1944 has been a year of uncertainty. Our Army and Navy were facing the crucial European battles. And they came through.

So, at this Christmas season if we cannot yet rejoice, we can see victory looming ever-larger in the future. O. Z. joins its voice in praise of our gallant fighting men, and expresses the hope that another year will see the world restored to peace and industry once again devoting its major efforts to serving civilian needs.

Seasons Greetings From

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Toggle Bolts—Expansion Anchors

TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain

Idaho Power Appoints Russell Superintendent

B. C. Russell has been appointed to succeed the late R. B. King as general superintendent of Idaho Power Co. He has had 33 years of experience in the electric utility business in the Snake River Valley of Idaho.

Russell came West in 1911 to work for the Idaho-Oregon Light & Power Co. During three years at Payette, Idaho and Ontario, Ore., he worked in line construction, distribution and transmission construction, power plant operation and construction. Moving to Boise in 1914, he worked first for the receiver of Idaho Railway Light & Power Co. and later for the Electric Investment Co. during reorganization. When Idaho Power Co. was formed in 1916, Russell began in the power department and succeeded to superintendent of power in 1921 and assistant general superintendent in 1943.

Veteran Purchasing Agent Retires from Utah Power

Retirement of A. D. Smith after 42 years as purchasing agent for Utah Power & Light Co. and appointment of W. C. Allen as his successor was announced recently by the company.

One of the best known purchasing agents in the West, Smith was honored at a dinner given by members of the Utah Purchasing Agents' Assn. and a group of sales managers.

Allen has been with Western Colorado Power Co. and Utah Power & Light for 22 years in accounting work. He is assistant treasurer of Western Colorado Power.

● MAURICE DUSENBERRY, commercial and industrial sales department supervisor for the Utah Power & Light Co., resigned that position recently to become Salt Lake City district manager for the Line Material Co. of Milwaukee, Wis., manufacturers of transformers, lightning arresters and similar equipment. Dusenberry, who has been with UP & L for the past 14 years, was supervisor of the commercial and industrial sales department for five years.

● GEORGE L. MEAGHER, superintendent of shops, warehouse and equipment for Seattle City Light, recently celebrated his fortieth anniversary of employment by the utility. He joined City Light in 1904 as an electrical machinist, became electrical machinist foreman in 1913, was promoted to general shop foreman in 1919 and to his present position in 1939.

Appliance Company Names Weaver to Coast Position

Appointment of Clarence L. Weaver as district manager of the Landers, Frary and Clark major appliance division in Washington and Oregon was announced recently by B. C. Neece, company vice-president and general sales manager. Weaver formerly was employed by Westinghouse Mfg. Co. and more recently had been with General Cable Co. in Seattle.

WEAVER

● JAMES H. ROGERS of Boise recently was elected a director of Idaho Power Co. He has been comptroller of the company since 1939 and in October 1943 was elected treasurer to succeed the later R. W. Miller. Before coming West, he was in electric utility work in Florida and New York.

● DAVID M. SALSBURY, who recently was transferred from Seattle to New York by Westinghouse Electric Supply Co., has been named vice-president and general manager of the company, according to recent announcement by B. W. Clark, company president.

● MAJOR ARTHUR M. PARKER, formerly a member of the staff of the Northern Electric Co. at Vancouver, has now been posted for service at Vancouver following completion of four and one-half years overseas with the Canadian Army.

● L. H. MILLER, acting city electrician at Vancouver, B. C., for the past few years, has been installed as city electrician. The action was taken by the city council in spite of protests of the Association of Professional Engineers of British Columbia, who objected that he had applied for registration but never had taken the required examination.

● WILLIAM A. SMITH, Westinghouse Electric & Mfg. Co., has been appointed panelboard specialist for the company in the Seattle area.

TOOLS—Channellock Pliers, Crescent Wrenches, Vise Grips, Open and Box Wrenches, Sockets, Pliers (needle nose, diagonals, etc.), Screw Extractors, Drivers, Wheel Pullers.
Remember—We have it, can get it, or it isn't made.
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SWITCHES, ENCLOSURES, ACCESSORIES
METER DEVICES COMPANY CANTON, O.

IT'S THE GRIP THAT COUNTS

The one-piece design of this Sherman "Uni-Crimp" Terminal makes it a better terminal at a lower cost. It provides a staunch, uniform, dependable terminal for aircraft, radio and other electronic services, automotive service, switchboards and many other applications.

The "Uni-Crimp" is a universal solderless terminal of simplified one-piece design which provides maximum mechanical strength and conductivity. It is fully interchangeable with other terminals of this type and can be quickly installed with hand crimping pliers or mechanical indenting tools already in use.

Standard sizes carried in stock. For terminals of special size, finish, etc., a letter to our engineering department submitting your specifications or requirements will receive prompt attention.

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977

A SNAP TO INSTALL

They make any outlet into an "Insulated Bushing", preventing cable insulation abrasion and resulting shorts.

Easy does it! Simply squeeze the two ends together and snap the Insuliner into place. You can install it before fishing, after fishing, or right over the wires in old work. T&B "Insuliner" sleeves come in a full range of sizes, ½" to 6", conduit or EMT. Patented. Approved by Underwriters Laboratories.

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Get in touch with them or any of our convenient offices today for "Insuliner" Bulletin s-5.

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THE THOMAS & BETTS CO.
INCORPORATED
manufacturers of electrical fittings since 1899
ELIZABETH, 1, NEW JERSEY
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Allis-Chalmers Makes Appointments on Coast

Five appointments to the Allis-Chalmers Pacific region sales division were announced recently by Frank Angle, manager of district offices.

A. J. Schmitz was named Pacific regional manager. He had been manager of the company's Seattle office recently and prior to that was Portland manager.

Four specialists were named to the Coast organization, including Frank Sullivan, Seattle; Frank Turner, Portland, and E. J. Baireuther, Denver, all specialists in cement, crushing and mining machinery, and Earl Lancaster, Los Angeles, switchgear specialist.

B. C. Electric Announces Personnel Appointments

Resignation of Ernest H. Adams, vice-president and controller of the B. C. Electric Railway Co. and treasurer of the B. C. Power Corp., holding company, was announced recently by W. G. Murrin, company president.

Appointed as executive vice-president and director was A. E. Grauer, and J. Lorn McLean becomes treasurer of the B. C. Power Corp. McLean, with E. W. Arnott, transportation manager, Thomas Ingledow, chief engineer, and W. C. Mainwaring, general sales manager, were named vice-presidents.

Adams went to Vancouver in 1908 from England, where he was with the then owners of the B. C. company. Four years later he was sent to Victoria as chief accountant. In 1917 he was made comptroller and in 1929 became vice-president.

R. E. Brennan Takes Post With Steamship Company

Ray E. Brennan, for the past 13 years treasurer and comptroller of Portland General Electric Co., Portland, resigned Dec. 1 to accept a position with Pacific-Atlantic Steamship Co., Portland, as assistant to the president.

Prior to coming to Portland, Brennan was treasurer and comptroller for utility properties owned by E. R. Diggs Co. of New York. Before that he was on the Chicago staff of Haskins & Sells and later with the United Public Service Co., Chicago. He is the president of the newly formed Portland Control of Controllers Institute of America.

● Utah Power & Light Co. has appointed P. P. Holton as superintendent in charge of construction and maintenance in its Rexburg division to succeed Charles M. Cannon, who was transferred to Salt Lake City as a distribution engineer.

SCHMITZ

ENGINEER ASSISTANT AND ASSOCIATE POSITIONS

PUBLIC UTILITIES EXPERIENCE

Needed to prepare engineering reports. Opportunity to secure peacetime future under State Civil Service.

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5TH FLOOR, STATE BLDG., S. F.

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THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

There is a Tork Clock for every regular switching job; 60 minute, 4 hour or daily cycles.

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"Copper-to-Copper Contact"

A vital point in a satisfactory ground is the connection between ground wire and ground rod. When a copper grounding wire is clamped to a Copperweld rod the connection is copper-to-copper. There are no dissimilar metals in contact under the ground to cause galvanic action or electrolytic corrosion. For ground connections that are permanently safe and dependable, specify Copperweld non-rusting ground rods—made by Copperweld Steel Company, Glassport, Pa.

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The replacement unit that fits all ranges—simplifies servicing—cuts dealer inventories—gratifies all users.

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When you are installing or re-arranging—and need a special transformer to exactly match your requirements—call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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1710 E. 57th St. Los Angeles, 11 Calif.

New Appointments Made by Bonneville Administration

Appointment of Victor G. Muzsnay as electrical engineer, consultant, and technical advisor for the Bonneville Power Administration's Puget Sound district office, and of Lawrence J. Parker as industrial engineer for the Mid-Columbia district, was announced recently. Muzsnay, who came to Bonneville from Philadelphia where he served for six years as chief electrical engineering draftsman for the Fourth Naval District naval yard, was born in Czechoslovakia and received his degree in electrical engineering at Bruenn, Czechoslovakia. He has worked in central station and transmission system design and construction work in Europe and the United States.

Parker, born in Seattle, Wash., and trained in electrical engineering and business at the University of Washington, has been with the West Coast regional office of the U. S. Maritime Commission at Oakland, Calif. Previously he served for about seven years as industrial power engineer and street and highway engineer for the Pacific Gas and Electric Co. at San Francisco.

● APPOINTMENT of John S. Bates as acting superintendent of power generation and of Norman G. Holmdahl as chief electrical and mechanical inspector at Grand Coulee power plant was announced recently. The two men will divide the responsibilities formerly handled by C. P. Christensen, who has been transferred to Boulder Dam as director of power.

● GIRARD DAVIDSON, who has filled the duties of general counsel for the OWU during absence of Herbert S. Marks, has resumed his post as general counsel for the Bonneville Power Administration.

Deaths

William Stussy, 68, former superintendent of power for the Montana Power Co., died Nov. 11 as the result of an automobile accident. Mr. Stussy, who retired this year, had been associated with the company and its predecessors since 1900 and had held the position of superintendent of power since 1913.

A native of Minnesota, Mr. Stussey was graduated from the University of Minnesota with a degree in electrical engineering and was in charge of electrical construction projects for the Missouri River Power Co., predecessor of Montana Power, for several years.

MEET THE NEWEST MEMBER

OF THE COMPLETE WESTINGHOUSE "UNITIZED" SWITCHGEAR FAMILY

Newest member of the Westinghouse "Unitized" switchgear family is the 50,000 kv-a Type DHM Switchgear (a *high voltage* unit with *air* breakers, for light duty).

SPECIFY IT for circuits up to 5000 volts, 600 and 1200 amperes. Interrupting capacity is 50,000 kv-a.

APPLY IT for switching equipment on main and auxiliary circuits of central stations, steel mills, industrial plants, distribution substations, customers' substations in office buildings.

INSTALL where reduction in floor space and height are important . . . where time and cost saved in installation is a consideration . . . where this rating and design are electrically and economically right!

New air circuit breakers make possible this new design. Type 50-DH-50 Breakers are completely self-contained, operate in normal atmosphere and require no external air under pressure. Get the story on this new Westinghouse switchgear—write for D.D. 32-130. Westinghouse Electric & Manufacturing Company, P.O. Box 868, Pittsburgh 30, Pennsylvania.

J-60562

ALL WESTINGHOUSE "UNITIZED" SWITCHGEAR OFFERS THESE FIVE MAJOR ADVANTAGES

1. QUICKER ORDERING, ASSEMBLY, SHIPMENT.
2. IMPROVED SERVICE CONTINUITY.
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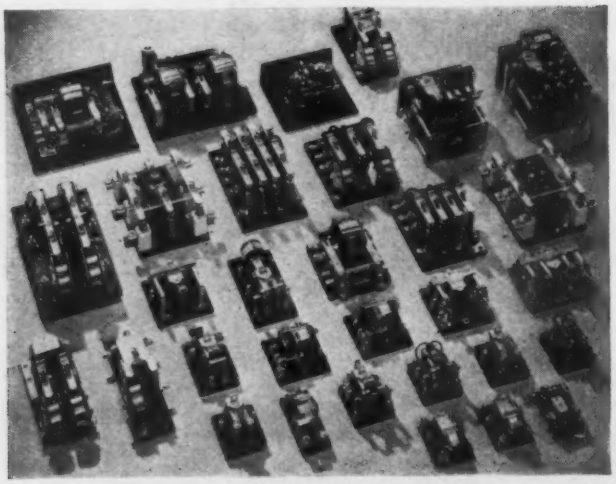
PLANTS IN 25 CITIES.. OFFICES EVERYWHERE

"UNITIZED" SWITCHGEAR



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These Bulletins are available describing light, intermediate and heavy duty relays in various types and contact combinations. Send for the data bulletins of interest to you.

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Electric control WL devices since 1892.

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ALL the strength and durability inherent in steel are combined---with definite economies---in Crapo Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of Crapo Galvanized Products near you or write direct for further information!

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Give Better
Commutation,
Longer Life,
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225 W. Pico Boulevard
Los Angeles, California

BUY MORE WAR BONDS

● W. G. BAUSMAN, lighting consultant for Southern California Edison Co. in Monrovia, was killed, Nov. 5, when a fast train hit his car as he was crossing the tracks near Monrovia. Mr. Bausman had been hard of hearing and it is thought that failure of his hearing aid may have contributed to the accident. He was well known in the lighting field, having previously worked for General Electric Supply Corp. in Los Angeles and at one time for Holophane Co. He was born in Silverton, Colo. and first worked for the Edison Co. in the shop and test division in 1930.

● C. W. GRIFFIN, manager of General Electric Co.'s Los Angeles appliance and merchandising factory branch, died suddenly of a heart attack at his home in Glendale on Nov. 5. Before taking charge of the G-E factory branch, in 1944, Mr. Griffin had been with the company's lamp department. He went with G-E in 1930 as radio sales manager for the Western region. In 1939 he became sales manager for the George A. Belsey Co., former G-E appliance distributor in the Los Angeles area, remaining until war was declared.

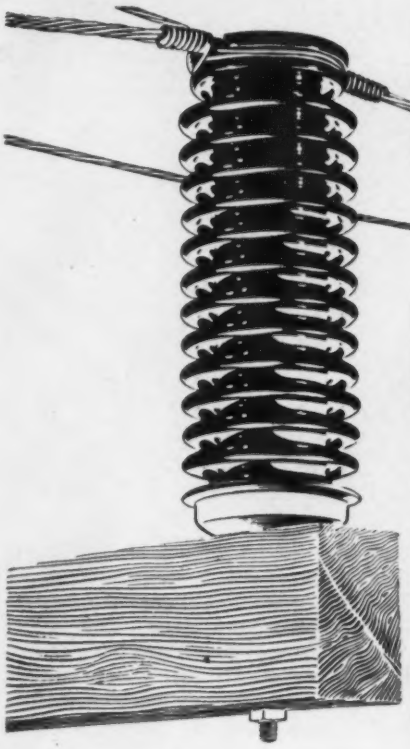
● MAJOR ROBERT SCOTT CLARK, former member of the advertising department of the B. C. Electric Railway Co. at Vancouver, B. C., has been killed in Italy, according to official advice received by his parents. A week prior to his death, he was mentioned in press dispatches when his company captured a tiger tank intact and almost 100 prisoners.

● CHARLES W. ERSKINE, general counsel for the Oregon Public Utilities Commission for the past five years, died Nov. 7 at the Veterans' hospital in Portland after an illness of several months. He had been in public legal work in the state for many years.

● HERBERT BORING, former sales engineer for General Electric Co. at Seattle, died recently in Oakland, Calif., following a prolonged illness. Born in Denver, Mr. Boring began with G-E in 1909. Ill health forced his retirement in 1942.

● RICHARD W. LOCKWOOD, assistant manager of priorities for Southern California Edison Co., died, Nov. 14. He had been with Edison Co. since 1925 and had previously served as chief clerk for the hydro division.

● RUSSELL WILBUR POIRSON, 41, sales manager for Flint Distributing Co., Salt Lake City, died recently following influenza. Mr. Poirson at one time was with Nash-Kelvinator at Denver.



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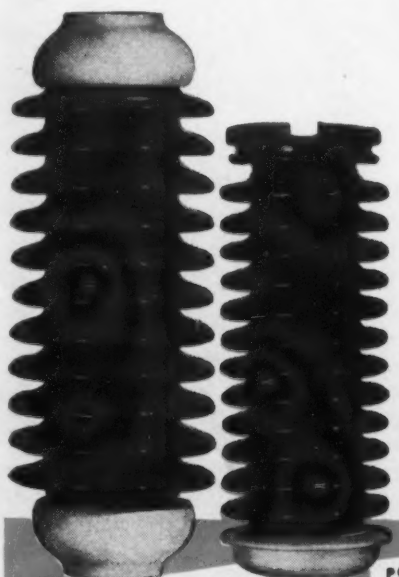
need not be "TEMPORARY CONSTRUCTION"

TRANSMISSION LINES ON WOOD POLES AND LAPP LINE POSTS ARE LONG-LIFE, LOW-TROUBLE LINES . . . . . THAT GO UP FAST AND USE A MINIMUM OF MATERIAL

• On a cost-per-year basis, transmission line construction on wood poles with Lapp Line Posts is most practical and economical. And today, if load demands make it necessary for you to build a new line under war-emergency restrictions, you'll find this same construction will require least in critical materials, least in man power. The extra height of Lapp Line Posts will give your line better clearance, or even in some cases permit use of shorter poles. Coordinate necessity measures with your long-time planning and build low-cost long-service lines—on Lapp Line Posts.



LAPP LINE POST and STATION POSTS on your system offer . .

POWER ARCOVER. *Flashover and leakage distances are not appreciably lowered by damage —even loss of several petticoats.*

NO PUNCTURE. *Puncture path in Lapp Post design is as great as flashover path. Insulator will flash over rather than puncture.*

NO CRACKING. *One piece post body, not subject to bursting from tension strains created by thermal changes in nested parts.*

RADIO INTERFERENCE. *By virtue of design factors alone, radio interference is permanently prevented at rated neutral voltage.*

NO CLEANING. *Fog-type design preserves uniform leakage path, prevents leakage flashover, makes the unit "self-cleaning."*

MECHANICAL RUGGEDNESS. *Stones or bullets deflect off, or rupture petticoats, leaving post body intact and insulator secure.*

Lapp

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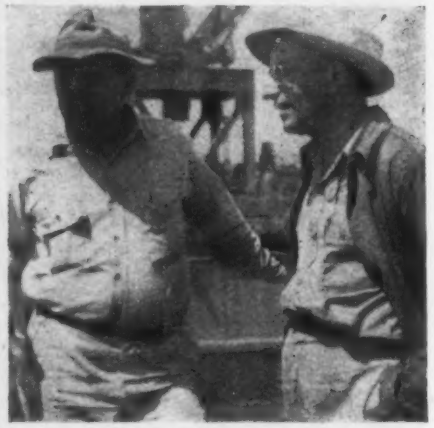
PROFILES *of the month*



Men who supervised the large crew and expedited the electrical job on the drydocks (see p. 60) were led by Jack Cimino, above, at the rear; Bill Hicks, assistant superintendent, who is seen checking a small diesel set; Victor Lasson, foreman of layout; and above, Lou Burris, job foreman in charge of power work; and Paul de Pietro, another assistant superintendent. Both Cimino and de Pietro were on loan from Severin Electric Co. to the Abbett Electric Co., contractor for the big navy job. At peak there were 250 electricians, both men and women, working on the drydock installation

Ever hear of a contractor retiring? Well, here is one who did, George Brouillet (standing) of Frank J. Klim Co., San Francisco. He was honored by San Francisco Electrical Contractors Assn., to which he belonged for over 30 years, at its Nov. 2 meeting. At the head table were George Smith, treasurer; Ed Scott, secretary; George Abbett, president

New officers of the Electrical Maintenance Engineers Assn. of Northern California, stepped up because of the recent death of James Stewart, are now: John Hayes, American Can Co., president; Ross Manseau, Bethlehem Steel Co., vice-president; and Phil Stoltz, Oakland Army Base, secretary-treasurer

TOMORROW'S INDUSTRY

There's an old saying, "In time of Peace, prepare for War." We are reversing the formula. We believe that in this time of war we must prepare for Peace.

What will be the industrial future of the Central and Northern California area when the world is done with fighting? Without relaxing any of our activities in support of the war effort, we are trying to find at least part of the answer *now* instead of waiting until Peace is declared.

As a part of our program of postwar planning we are conducting a survey of actual conditions.

What sites are available to industries which, after the war is ended, might wish to establish themselves here? What are their transportation facilities, water supplies, raw material resources, labor conditions, etc?

We are cooperating with other agencies to gather this essential information. When the time comes for conversion of war industries to peacetime production and for establishment of other plants to supply the West's rapidly growing population we will be able to assist that development.

And we will be prepared to serve the new industrial communities with light, power and heat for their operations.

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Home Planning Institutes, held under the auspices of the State Adult Education Department, bring the home-building trades into contact with thousands of interested potential home owners and others who hope to modernize their dwellings.

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- KITCHEN PLANNING
- LAUNDRY FACILITIES
- ADEQUATE WIRING
- HOME LIGHTING

An unexcelled opportunity to sell *your* products and services through education and expert advisory instruction. *Prepare now for postwar homes.*

If your town has not yet organized a Home Planning Institute the Association will provide the necessary information upon request. *Write today.*

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